BROUWER SOD HARVESTER

RoboMax JD

John Deere. Model 6230 Tractor

OPERATOR'S MANUAL

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RoboMax JD

Sod Harvester

Operator's Manual

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Sod Harvester

FOREWORD

IMPORTANT

The Owner and Operator, must assume responsibility for the safe operation of the machine, their own safety, and the safety of others, by reading, understanding, and following, all of the safety instructions and operating procedures as outlined in the machines Operator's Manual.
Failure of the Owner or Operator to adhere to the recommended safety instructions and operating procedures, indemnifies Brouwer Turf Inc. against any claims that may arise, due to accidents resulting in personal injury or property damage.

It is not possible to list all situations that may affect the safety of the machine or the operator, and therefore Brouwer Turf Inc. cannot list all precautions, and identify all potential hazards, that may prevent accidents.

IF YOU DO NOT UNDERSTAND….ASK

BE A QUALIFIED OPERATOR BY ;

- Reading and obeying the instructions in this manual, the tractor manufacturers operator's manual, and the safety decals on the machine.
- Receiving operational training on the sod harvester.
- Asking your supervisor or equipment dealer to explain anything you do not understand.
- Explaining the written instructions in the operator's manual and safety decals to user/operators who cannot read or understand them.

WARNING

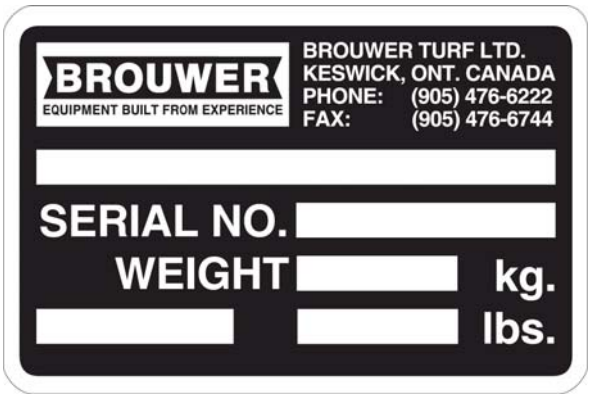
The Brouwer **Robomax Sod Harvesters** are designed for safe efficient operation and must not be used for any purpose other than that for which they are designed.
Prior to being shipped from the manufacturer the machines are inspected to insure that all safety guards, shields and warning/safety/operating decals are correctly positioned and secure
Before operating the machine the operator must check that all of the above items are correctly located.
The machine must not be used if any guards, shields or warning/operating decals are damaged or missing..

Your new **RoboMax JD** Turf Harvester has been designed and built to give many years of outstanding performance. The service and reliability you receive from this product will be affected by the proper maintenance and operation of the machine.
Use only genuine Brouwer replacement parts. Parts not supplied by Brouwer may not meet Brouwer specifications or standards of manufacture and may void warranty. The use of non-approved parts may result in component failure and possibly cause in an accident to the operator or others.

IMPORTANT

MODEL NUMBER
The Model Number appears on sales literature Technical manuals and price lists.

SERIAL NUMBER
The serial number applies only to the machine to which it is allocated.
The serial number **MUST** be quoted when ordering parts or calling for service or warranty



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Specifications

Conveyor	**Rubber or Mintex.**
Cutting Head	**Full Floating.**
Width of Cut	**16in. (406mm) 23in.(584mm) 24in. (610mm).**
Length of Cut	**24in. (610mm) to 100in.(2540mm).**
Thickness of Cut	**Hydraulically Adjustable to 3in. (760mm).**
Cutter Drive	**Variable Hydraulic.**
Conveyor Drive	**Variable Hydraulic.**
Cutting Blades	**Standard with Fingers /V-Blade.**
Standard Pallet Size.	**48 in. x 48 in. (1219 x 1219mm).**
Optional Pallets. For two sided Pallet Injector.	**31.5 in. x 47.25 in. (800 x 1200mm).** **39.4 in. x 47.25 in. (1000 x 1200mm).**
Construction	**High Strength Steel Weldment.**
Total Weight. With : Standard Pallet Injector.	**21600 lbs. (9798kg.)**
Optional Pallet Injector.	**22604 lbs. (10025 kg).**
Overall Length	**252 in. (6400mm.)**
Overall Width	**160in. (4064mm.)**
Transport Width	**129in. (3276mm.)**
Overall Height	**97.5in. (2476mm.)**
Pallet Configuration	**Pyramid or Flat Top.** **Upper level Squeeze Function.**
Flap Control	**Individual Automatic.**

TRACTOR MODEL.	**John Deere 6230.**

IMPORTANT

Refer to the Tractor Operator's/Service Manual that is supplied with the harvester for complete tractor specifications, operating and service instructions.

Due to the constant program of product development, specifications may change without notice or obligation.

SECTION 1

Safety Symbols.	1-01
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WARNING

Unauthorized modifications may result in **extreme safety hazards** to operators and bystanders, and could result in damage to the machine.

Brouwer Turf Inc. warns against and strongly rejects and disclaims against any modifications, add-on accessories or product modifications that are not designed, developed, tested and approved by Brouwer Engineering Department.

Any Brouwer product that is altered or modified in anyway that is not authorized, after original manufacture, including after market accessories or component parts that are not approved by Brouwer Turf Ltd. will result in the machines warranty being voided.

All liability for personal injury and/or property damage caused by any unauthorized modifications, add-on accessories or products not approved by Brouwer Ltd. will be considered the responsibility of the individual(s) or Company designing and/or making such changes.

Brouwer Turf Inc. will vigorously pursue full indemnification and costs, from any party responsible for unauthorized post manufacture modifications and/or accessories, should personal injury and/or property damage result from any of the above.

DANGER

TO PREVENT POSSIBLE SERIOUS INJURY OR DEATH :
Under no circumstances is any service or maintenance work to be performed on the machine until :

- **THE ENGINE IS SWITCHED OFF.**
- **THE IGNITION KEY IS REMOVED.**
- **THE CAB DOOR IS LOCKED.**

Brouwer Turf Inc. cannot stress too strongly the importance of Owners/Operators adhering strictly to the safety recommendations as stated in this manual.

This Symbol means :

- **ATTENTION !**
- **BECOME ALERT !**

Your safety and that of others is involved.

Signal word definitions.

The signal words below are used to identify levels of 'hazard' seriousness. These words appear in this manual and on the safety decals that are placed on the machine.
For your safety and that of others, read and follow the information and instructions given with these signal words and/or the symbol shown above.

DANGER:
Indicates an imminently hazardous situation which if not avoided **WILL** result in death or serious injury.

WARNING:
Indicates a potentially hazardous situation which if not avoided **COULD** result in death or serious injury.

CAUTION:
Indicates a potentially hazardous situation which if not avoided **MAY** result in minor or moderate injury.
It may also be used to alert against unsafe practices or property damage.

CAUTION:
Used without the safety alert symbol indicates a potentially hazardous situation which if not avoided **MAY** result in property damage.

Safe Operation

Operator preparation and Training.

Read the ***RoboMax*JD** Operation and Safety Manual, and also the tractor Owner/Operating manual. They must be kept on the machine at all times.

- If an operator or mechanic cannot read and understand English, it is the owners responsibility to explain the material contents to them.
- If any of the information or instructions in this manual are not clear, contact your dealer or the factory representative for clarification.
- Become familiar with the safe operation of the machine, the operating controls and the safety decals. If there are any questions concerning safety, do not operate the machine until they are clarified.
  All safety guards and shields must be kept in place and in good condition. All interlock switches must be correctly adjusted.
- It is the owners responsibility to ensure that all operators and service personnel are trained in the proper operation and service procedures of the machine.
- Wear appropriate work clothing, safety equipment and work boots. Do not operate the machine with loose clothing, long hair, or any jewelry, that may get tangled in moving parts.

  CAUTION

  Wear suitable hearing protection such as earmuffs or earplugs, to protect against hearing impairment or hearing loss.

  Operating equipment safely requires the full attention of the operator. Do not wear radio or music headphones while operating the machine.
- Never allow children or untrained persons to operate this equipment. Local regulations may restrict the age of the operator.
- Only the operator must be on the machine, never allow riders on the machine. Riders can be injured by foreign objects or can be thrown off the machine. Also they may obstruct the ability of the operator or the operators view resulting in unsafe operation of the machine.
- The warning/safety decals must be kept clean, legible, and undamaged. Do not operate the machine if any decals are missing or damaged. Obtain new decals from the factory.
- Do not operate the machine if drugs, alcohol or medication are being used that can affect the alertness or co-ordination of the operator. Seek professional advice, before operating the machine, if there is any doubt about the side affects of any medication being taken that may put your safety and that of others at risk.
- Keep animals and bystanders clear of the machine, at a safe distance, when operating the machine.
- The owner/operator is responsible for accidents and/or injuries that may occur to themselves, bystanders, or property that may occur as a result of the operation of this machine.

Machine preparation

- Check the ‘operator presence’ interlock switch is operating. Check tractor brake operation. Repair or adjust any problem before operating the machine.
- Do not tamper with, or defeat, safety devices. Keep guards, shields and interlock safety devices in place and in proper working condition. They are for your protection.
- Check regularly that all fasteners, that is, nuts/ bolts, and retainer pins are secure.
- Check daily that the machine is in good working condition. Check all tires for damage or excessive wear.
- Use only accessories, attachments and replacement parts that are approved by the manufacturer.

IF YOU DO NOT UNDERSTAND….ASK

General Operating Safety

- Ensure all persons are clear of the machine before starting the tractor engine. Keep hands and feet clear of the cutting unit and all moving parts.

- Do not make sharp turns. Exercise care when reversing and maneuvering. Look behind the machine and downward when reversing.

- Keep all persons clear of the Robotic Arm operating areas and pallet cavity, it may move suddenly and result in serious injury.

- Use counterweights, wheel weights or ballast, only as recommended by the manufacturer.

- Exercise caution when approaching or crossing roadways.

- Put the transmission in **NEUTRAL and apply the Parking Brake** before dismounting. Leaving the transmission in gear with the engine stopped will not prevent the tractor from moving.

WARNING

Never attempt to get on or off the machine when it is moving.
Before leaving the operating position, place the transmission in NEUTRAL, set the 'park brake', lower the cutting head and forks to the ground, stop the engine and remove the ignition key.

Starting the Tractor

WARNING

To avoid possible injury or death from a runaway machine, **DO NOT** start the engine by shorting across the battery terminals. The machine can start when in gear if the normal safety circuitry is bypassed.

- Start only in accordance with the instructions in this manual and also the tractor operators manual.
- **DO NOT** use starting-aid fluid.

- Never start the engine from the ground. Start only from the operator's seat, with the transmission in **NEUTRAL** and park brake '**ON**'.

Transporting

- Exercise caution when loading or unloading the machine on or off a truck or trailer.

- Ensure that the machine is properly 'blocked' and secured during transport.

Operating

- Do not change the engine governor setting, or over-speed the engine.

WARNING

Work in a ventilated area. Never operate the machine without adequate engine exhaust ventilation.
Never run the engine in an enclosed area. Exhaust fumes contain carbon monoxide and can be fatal if inhaled.

- Inspect the area to harvested and remove any objects that may be hazardous or may cause an injury.

- Operate with adequate light and avoid any holes and other hazards.

Highway Operation

- To prevent collisions with other vehicles, slow moving tractors with attachments, towed equipment or self-propelled machines, frequently check for traffic from the rear, particularly when making turns, always use turn signal lights.

- Slow down and exercise caution when making turns and crossing roads and railway tracks.

- Use headlights, flashing warning lights and turn signals day and night. Follow local regulations for equipment lighting and marking.
Ensure that all lighting, signals and markings are visible, clean and in good working order.
Repair or replace any lights, signals or marking that is damaged or is missing.

- Couple brake pedals together for road travel.

To prevent Tipping

- Avoid holes, ditches, slopes, and obstacles that may cause instability and the machine to tip.

WARNING

Never drive close to the edge of a gully or steep embankment that may collapse and cave-in, causing the machine to tip.

- Shift to a LOW gear before descending a steep hill, to assist in braking and improving your control of the machine.
  Use engine braking to reduce speed before applying the tractor brakes.

- Never coast down a hill, run-away machines are liable to tip.

- Slow down and exercise caution when making turns and changing direction on a slope.

Stopping Operation

- Before stopping the engine: Reduce the engine speed to **'SLOW'** and let it operate at 'no load' for five to ten minutes, to allow the engine to cool down.

To safely park the machine:

- Stop it on level ground, move all controls to the **'OFF'** position. Lower the Cutter Head and Forks to the ground. Put the transmission in **NEUTRAL,** apply the brakes and stop the engine. Before leaving the operator's seat, wait for the engine and moving/rotating parts to stop. Remove the ignition key.

To free a 'mired' machine.

- Check that all towing devices are of adequate size/strength to handle the load.
- Always attach to the Draw Bar of the towing unit. Do not use the front attachment point. Apply power smoothly to take up slack, a sudden pull could 'snap' the towing device causing it to 'whip' or 'recoil' dangerously.

Caution should be exercised when attempting to free a machine that is stuck in mud. Hazards that can occur when towing, and are to be avoided are:

- The towing tractor overturning.

- The tow chain failing and recoiling. (Use of a cable is not recommended).

- Tow-bar failing.

- The harvester becoming unstable and tipping.

The following procedures are recommended;

- If possible reverse the machine out, if it is 'mired' in mud.
- Dig mud out from behind the wheels. Place boards behind/under the wheels and reverse out **'slowly'. Keep bystanders clear of the rear of the machine**
- Dig mud out from in front of the wheels and drive ahead **'slowly'**.

Maintenance Safety

WARNING

Do not service or repair this machine with the attachments in the raised position, unless they are securely blocked, or the safety devices are engaged.
Failure to do so could result in serious injury or death

- To attain maximum safety and the optimum harvesting results, maintain your RoboMax Harvester according to the recommended schedules and instructions in this manual.

- When servicing or operating the machine do not wear loose clothing or jewelry that can entangle in machinery and cause personal injury.

- Never allow untrained persons to operate or service the machine.

- Allow the engine and rotating/moving parts to come to a complete stop before attempting any service or repair work.

- Disconnect the battery cables before making any repairs, and before doing any welding on the machine. Disconnect 'negative' first, then 'positive'. Reconnect in the reverse order.

- Carefully release pressure from components with 'stored' energy.

- Park the machine on smooth, firm, level ground.

- Replace worn, damaged, or faulty parts with parts supplied by the manufacturer.

- Before working on the machine, lower the Cutter Head and Forks to the ground. If the machine needs to be raised, use jack stands. If left in a raised position hydraulic supports can settle or 'leak' down.

Maintenance Safety

WARNING

Do not support the machine on cinder blocks, hollow tiles, or props that may crumble under continuous load.
Do not work under a machine that is supported solely by a hydraullic jack.

- To reduce fire hazards: Keep the engine, muffler, battery compartment and fuel storage area free of grass, leaves, debris or grease build-up.
- Clean-up any fuel or oil spillage.

Handling Fuel

WARNING

- Exercise caution when refueling
  Do not over-Fill. Fuels are flammable and vapors are explosive. Avoid spillage. If using fuel cans use only approved containers and a funnel. Clean-up spills immediately.
- Do not smoke or allow naked flame or cause sparks near the fuel.
  Never drain or fill the fuel tank indoors.
- Never remove the Fuel Tank Cap or add fuel when the engine is running or if it is hot.
- Never handle or store fuel containers near an open flame or any device that may create sparks and ignite the fuel or vapors.
- Ensure that the Closure Caps on the Fuel Tank, and the containers, are replaced tight and secure.

WARNING

To prevent sparks from static discharge:

- Do not fill containers in a vehicle, on a truck, or a trailer bed that has a plastic liner. Fill the containers on the ground, away from the vehicle.

- Always keep the fuel dispenser nozzle in contact with the rim of the fuel tank, or container opening, until fueling is completed.
- Do not use a nozzle lock-open device.
- Always be prepared in case of fire. Keep a first-aid kit and fire extinguisher close to hand.
- Keep emergency numbers for fire, hospital, ambulance services, and doctors close to your telephone.

Hydraulic System

WARNING

The RoboMax Hydraulic System operates under high pressure.
To prevent serious injury from hot, high pressure oil:

- Never check for leaks with bare hands. Use cardboard, paper or wood.
- High pressure oil can penetrate the skin. If it is injected into the skin it must be surgically removed within a few hours, by a doctor familiar with this type of injury. Failure to do so may result in gangrene.

- Relieve high pressure before disconnecting hydraulic lines or fittings.
- Fully tighten fittings and connections before pressurizing the system.
- Lower Cutter Head and Forks to the ground, disengage all drives, apply the park brake, stop the engine and remove the ignition key, before inspecting or disconnecting hydraulic lines or fittings.
- Visually check daily all hydraulic hoses, tubes and fittings for leaks. Replace any worn or damaged hoses, tubes or fittings before operating the machine.
- Replacement hoses or tubes must be routed in the same location and path. Do not move clamps, brackets or ties to new locations.
- Thoroughly inspect all hoses, tubes and fittings every 300 hours.

IMPORTANT

To prevent serious damage to the hydraulic **system** components, do not allow any contaminants to enter the hydraulic system. Clean thoroughly around all fittings and areas to be worked on. Cap and plug any connections that are disconnected.

- Before disconnecting, tag or mark the location of the connection.
- Check that ‘O-Rings’ are clean and hose fittings are properly seated before tightening.
- Align the hoses without twisting. Twisted hoses can cause couplings to loosen as the hose flexes during operation, resulting in oil leaks.
- Kinked or twisted hoses can restrict the oil flow causing the system to malfunction, the oil to overheat and possible hose failure.

Cooling System

WARNING

To prevent serious injury from hot coolant and steam, **DO NOT** remove the radiator cap when the engine is running and/or hot. Allow the engine and system to cool, and use caution when removing the radiator cap.

- Do not operate the engine without the recommended coolant mixture.
- Add top-up coolant into the recovery tank **NOT** directly to the radiator
- Ensure that the radiator cap is tight and secure.
- If the radiator cap must be removed, stop the engine and allow the cooling system to cool, until the cap is cool to the touch. Loosen it slowly to relieve pressure, before removing completely.

Battery Service

WARNING

The sulfuric acid in the battery electrolyte is poisonous. It can cause serious skin burns and blindness if splashed in the eyes.

CAUTION

Always wear protective glasses/goggles, and protective clothing and use insulated tools when working with batteries.
Read, understand, and obey the battery manufacturers instructions and warnings.
Battery posts, terminals and relate accessories contain lead, lead compounds and chemicals, wash your hands after handling them.

Avoid Hazards By:

- Fill/top-up batteries in a well ventilated area.
- Wearing eye protection and rubber gloves.
- Avoid breathing fumes.
- Avoid spilling, splashing or dripping electrolyte.
- Follow proper 'jump-start' procedure.

If acid is splashed on your person:

- Flush the affected skin with water.
- Apply baking soda, or lime, to help neutralize the acid.
- Flush your eyes with water for 15 to 30 minutes. Get medical help immediately.

If acid is swallowed:

- Do not induce vomiting
- Drink large quantities of water or milk, but do not exceed 2 liters (2 Quarts).
- Get medical help immediately.

Battery Charging

- Charge batteries in an open well ventilated area, away from sparks or open flame.
- Unplug the charger before connecting or disconnecting the battery.

Jump Starting

- Check that the Jumper cables are in good condition.
- Turn the ignition and all electrical accessories 'OFF', on both machines.
- Position the machine with the 'charged' battery close to, but not touching, the machine with the dead battery, to ensure that the cables will easily reach.

Connecting the Cables

- Do not allow the cable clamps to touch any metal parts except those intended.
- Never connect the **positive '+'** (red) terminal to the **negative '-'** (black) terminal.
- Ensure that the cables cannot get caught in moving engine parts when starting.
- Connect one end of the **positive '+'** (red) cable to the **positive '+'** terminal on one battery. Connect the other end to the **positive '+'** terminal on the other battery
- Connect one end of the negative '**-**' (black) cable to the negative '**-**' terminal on the 'charged' battery. Connect the other end of the cable **to the engine block** on the machine with the 'dead' battery.
- Start the machine that has the 'charged' battery, then start the machine that has the 'dead' battery.
- Remove the jumper cables in the exact reverse order of connecting. Do not allow the cable clamps to touch any metal parts while the other end is connected to a battery terminal.

IMPORTANT

Keep the battery terminals clean. Smear them with white grease to prevent corrosion.
The positive terminal (red) protective cover must be kept in place.

Transporting and Storage

- If the machine should become disabled, and cannot be moved under its own power, it should not be towed, as it would be extremely difficult to steer and stop it.
- It is recommended that it be transported on a flat-bed carrier or a truck/trailer. Use chains to secure the machine on the carrier.

Storage

IMPORTANT

If the Harvester is to be stored 'inside' keep the doors open to ensure good ventilation until the procedure below is complete.

- Stop the engine and allow it to fully cool down.
- Drain the fuel tank into an approved container and shut off the fuel. Store the fuel in a cool dry location.
- Disconnect the battery cables.
- Keep the Harvester and fuel containers in a locked, secure storage place, to prevent tampering, and children from playing in the area.
- Do not store the Harvester or fuel containers close to heating appliances with an open flame, such as a water heater with a pilot light.

Safe Service Procedures

- Do not service the harvester when it is moving or the engine is running.
- When servicing a four wheel drive machine, when necessary raise **front and rear wheels** off the ground. This is to prevent the machine being pulled of the jack stands if power is applied to the wheels.
- Tighten the wheel lug nuts to the correct torque as specified in the tractor manual.
- Refit all safety guards and shields that may have been removed during service.

Tire Service

WARNING

Do not operate the harvester if any of the tires are badly worn or damaged.
The tractor tires are loaded with liquid ballast, and are **extremely heavy. Exercise caution when removing or replacing them.** Use suitable tools, equipment and hoists with adequate lift capacity. **Only qualified and experienced personnel must service the wheel assemblies.**

CAUTION

Operating the machine with loose wheel lug nuts will result in damage to, and require the replacement of, wheel assembly components.

- Always maintain the correct tire pressures. **Do not** inflate tires above the recommended operating pressure shown on the side wall.

DANGER

Never weld or heat a wheel/tire assembly. The heat can cause increased air pressure and result in the tire exploding. Explosive separation of tire and rim components will result in serious injury or death

- When inflating tires use a clip-on chuck, and a air hose that is long enough to allow you to stand to one side of the wheel, not in front or over it. Use a safety cage if one is available.

Handling Chemical Products

CAUTION

To prevent serious personal injury avoid direct exposure to hazardous chemicals. Potential hazardous chemicals include : fuels, lubricants, coolants, paints and adhesives.

Material Safety Data Sheets (MSDS)

Material Safety Data Sheets provide specific details on chemical products that affect:

- Physical and personal health hazards.
- Safety procedures.
- Emergency response techniques

It is recommended that the MSDS data is checked before a job is started that involves a hazardous chemical. This informs of the possible risks and the safest way to proceed. Follow carefully the recommendations.

Proper Waste Disposal

- Improper disposal of waste material is harmful to the environment. Some potentially harmful products used on machines are: oil, fuel, filters coolant, brake fluid, and batteries.
- Use leak proof containers when draining fluids. Do not use food or beverage containers that someone may mistakenly drink from.
- Do not pour waste fluids onto the ground, down a drain or into any natural water source.
- Air conditioning refrigerants are harmful to the atmosphere. Government regulations may require a certified technician to service and properly recover and recycle refrigerants.

- Before disposing of waste material, enquire at your local environmental or recycling facility for instructions on proper waste disposal.

Welding on Painted Areas

CAUTION

Hazardous fumes are generated when paint is heated when welding, soldering, or using a torch. The use of an approved respirator is recommended when welding, sanding or grinding on painted areas, to avoid the inhalation of fumes or dust.

- It is recommended that paint be removed a minimum of 4 inches (100mm) from around the area to be affected by heating.
- If solvent or stripper is used, wash them off with soapy water before doing any welding. Remove any stripper or solvent containers and other flammable material from the area. Allow a minimum of 15 minutes for fumes to disperse before welding.
- Do not use chlorinated solvent in areas where welding will be done. Do all work in an area that is well ventilated to allow fumes and/or dust to disperse.

CAUTION

Do not weld, solder or use a torch close to pressurized fluid lines, that may cause them to burst. Flammable spray can be generated by burst fluid lines resulting in severe burn injury to yourself and bystanders.

CAUTION

To protect both of the Electronic Controllers from potential damage :

Do not do any welding on the machine until :

- Both battery cables are disconnected.
- The Plus 1 Micro-controllers are disconnected.

D001-183

CAUTION

Exercise extreme caution and verify proper locations when removing/installing Controller Connections.

CAUTION

To prevent damage to the bearings, **DO NOT pressure wash the top seal face of the Slewing Ring.** Re-lubricate every 150 hours.

D001-221

D001-221

00-226

WARNING

ROBOT ARM CAN CRUSH.
-MOVEMENT CAN OCCUR UNEXPECTEDLY.
-STAY CLEAR WHILE ENGINE IS RUNNING.
-STOP ENGINE BEFORE ENTERING PALLET AREA OR SERVICING.
4135015

4135015

WARNING

ROBOT ARM CAN CRUSH.
-MOVEMENT CAN OCCUR UNEXPECTEDLY.
-STAY CLEAR WHILE ENGINE IS RUNNING.
-STOP ENGINE BEFORE ENTERING PALLET AREA OR SERVICING.
4135015

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00-226

WARNING

CRUSHING HAZARD
To prevent serious injury, stay clear of moving parts.
D001-032

D001-032

WARNING

KEEP WELL CLEAR OF THIS AREA AT ALL TIMES.
Gate can open and close without warning.

D001-223

WARNING

ROBOT ARM CAN CRUSH. GRIPPER FINGERS CAN PIERCE OR CRUSH.
-MOVEMENT CAN OCCUR UNEXPECTEDLY.
-STAY CLEAR WHILE ENGINE IS RUNNING.
-STOP ENGINE BEFORE SERVICING.
4135014

4135014

WARNING

MACHINE CAN CRUSH OR ENTANGLE.
-MOVEMENT CAN OCCUR UNEXPECTEDLY.
-STAY CLEAR WHILE ENGINE IS RUNNING.
-STOP ENGINE TO CLEAN OR SERVICE.
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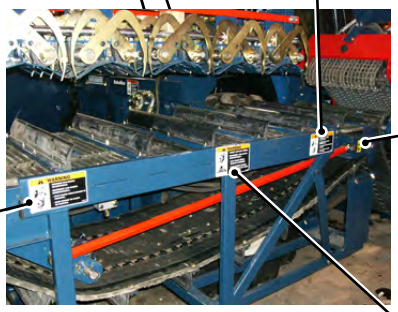
(Typical in 2 places. One at each end of the Gripper Head.)



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WARNING

MACHINE CAN CRUSH OR ENTANGLE.
-MOVEMENT CAN OCCUR UNEXPECTEDLY.
-STAY CLEAR WHILE ENGINE IS RUNNING.
-STOP ENGINE TO CLEAN OR SERVICE.
4135016

4135016

WARNING

ROBOT ARM CAN CRUSH. GRIPPER FINGERS CAN PIERCE OR CRUSH.
-MOVEMENT CAN OCCUR UNEXPECTEDLY.
-STAY CLEAR WHILE ENGINE IS RUNNING.
-STOP ENGINE BEFORE SERVICING.

4135014

CAUTION

BEFORE WORKING ON THE CUT-OFF MECHANISM THE CAM FOLLOWER MUST BE CLEAR OF THE CUT-OFF CAM

D001-099

D001-099

WARNING

KEEP ALL SHIELDS IN PLACE.

DO NOT OPERATE UNIT WITH SHIELD REMOVED.

00-370

00-370

CAUTION

System under pressure.

Do not open cap when hydraulic system is hot.

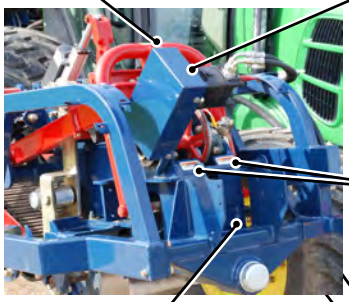
006204

006204

HYDRAULIC OIL

D001-022

D001-022



WARNING

CRUSHING HAZARD

Stay clear of moving parts

D001-054

D001-054

WARNING

KEEP CLEAR OF CUTTING HEAD.

009097

009097

CAUTION

Do not step on conveyor at any time

D001-116

D001-116

WARNING

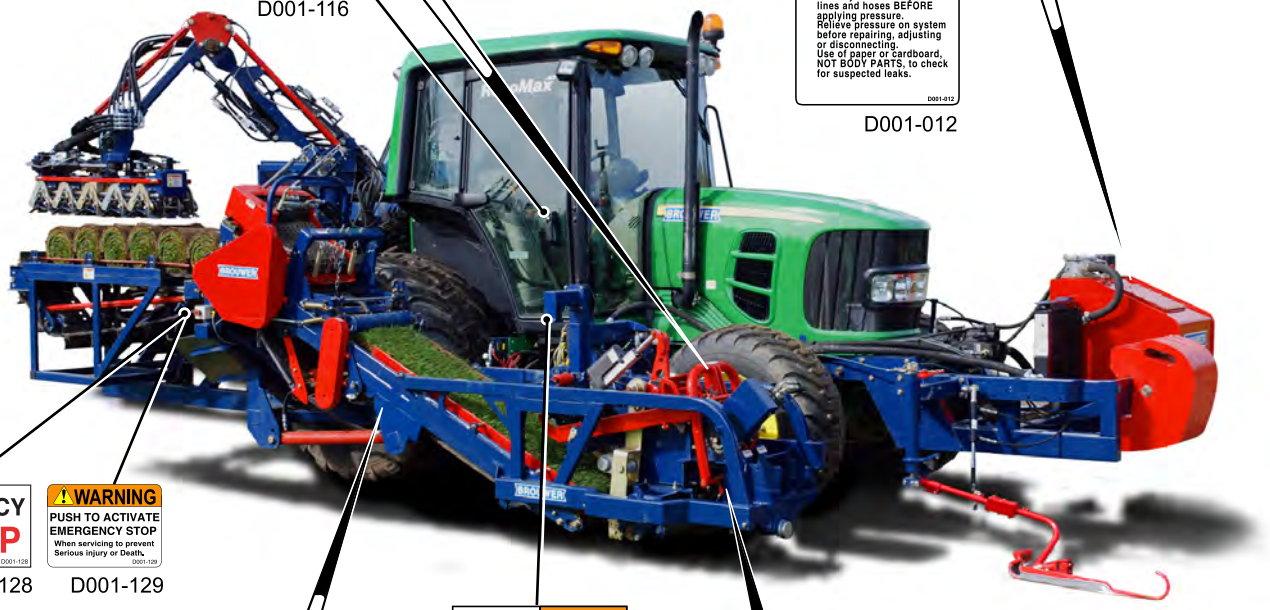
HIGH PRESSURE FLUID HAZARD

To prevent serious injury or death from escaping hydraulic fluid.

- Visually check all hydraulic lines and hoses BEFORE applying pressure.
- Relieve pressure on system before repairing, adjusting or disconnecting.
- Use of paper or cardboard, NOT BODY PARTS, to check for suspected leaks.

D001-012

D001-012



EMERGENCY STOP

PUSH TO STOP

D001-128

D001-128

WARNING

PUSH TO ACTIVATE EMERGENCY STOP

When servicing to prevent Serious injury or Death.

D001-129

D001-129

WARNING

MACHINE CAN CRUSH

- MOVEMENT CAN OCCUR UNEXPECTEDLY.
- STAY CLEAR WHILE ENGINE IS RUNNING.
- STOP ENGINE TO CLEAN OR SERVICE.

4137371

4137371

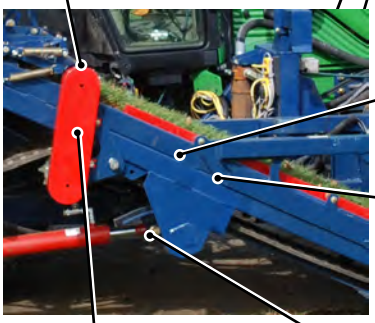
WARNING

CRUSHING HAZARD

Stay clear of moving parts

D001-054

D001-054



WARNING

KEEP CLEAR OF CONVEYOR.

015900

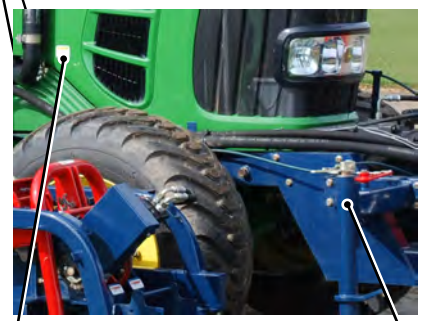
015900

CAUTION

Do not step on conveyor at any time

D001-116

D001-116



WARNING

KEEP ALL SHIELDS IN PLACE.

DO NOT OPERATE UNIT WITH SHIELD REMOVED.

00-370

00-370

IMPORTANT

The Cylinder Lock is to be used ONLY DURING SERVICING.

Do not use when transporting, as shock loads could damage the Harvester.

D001-136

D001-136

CAUTION

HOT EXHAUST

To avoid injury keep clear of exhaust pipes and muffler.

D001-053

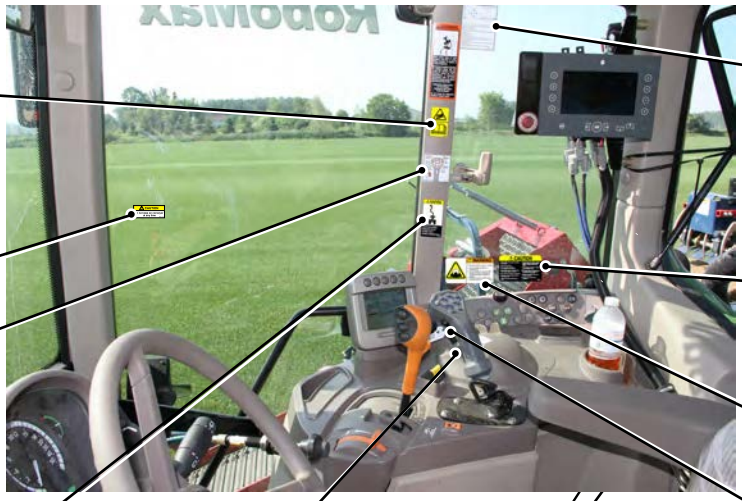
D001-053

WARNING

HOLD ACTUATOR LEVER WHEN DISCONNECTING. RELEASE THE ACTUATOR SPRING TENSION SLOWLY.

D001-066

D001-066



2000653

⚠ CAUTION
Do not step on conveyor at any time
D001-116

D001-116

D001-228

⚠ CAUTION
AVOID INJURIES, ENGAGE AUTO-STEER ONLY WHEN HARVESTING.
015499

Thin ⇧ DEPTH CONTROL ⇩ Thick
Lower ⇧ CUTTER HEADS ⇩ Raise
D001-202

CAUTION
To protect both of the Automotive Controller from potential damage :
Do not do any welding on the machine until :
- Both battery cables are disconnected.
- The Automotive Controller is disconnected.

D001-184

⚠ WARNING
To prevent serious injury or death the operator must read the safety warnings and instructions in the Machine and the Tractor Operator's manuals. The manuals must be kept on the machine at all times.
- **The operator MUST NOT leave the operator's seat while the engine is running and attempt to make any adjustments, free a jammed mechanism or clear debris, particularly at the rear of the machine in the vicinity of the Gripper Head, Robotic Arm and the Pallet injection area.**
- **Bystanders must be kept clear of the machine when in operation**

When leaving the machine unattended, place in 'PARK', stop all functions, lower the Conveyor, Pallet Forks, and Gripper Head. Stop the engine, remove the ignition key and lock the cab door.
D001-222

D001-222

⚠ WARNING
KEEP WELL CLEAR OF THIS AREA AT ALL TIMES.
Gate can open and close without warning.
D001-223

D001-223

⚠ WARNING
CRUSHING HAZARD
To prevent serious injury, stay clear of moving parts.
D001-032

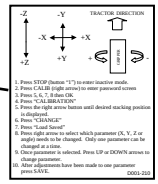
D001-032

⚠ WARNING
NO RIDERS
Vehicle is to be ridden in operators seat only. Failure to do so could result in death or serious injury.
D001-024

D001-024

⚠ WARNING
PALLET DISPENSER CAN CRUSH.
-MOVEMENT CAN OCCUR UNEXPECTEDLY.
-STAY CLEAR WHILE ENGINE IS RUNNING.
-STOP ENGINE BEFORE ENTERING PALLET AREA OR SERVICING.
4136687

4136687



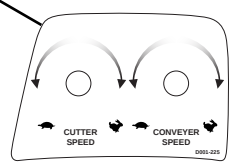
D001-210

⚠ CAUTION
4133093

⚠ WARNING
To Prevent Serious Injury or Death
- Avoid unsafe operation or maintenance
- Do not operate or work on this machine without reading and understanding the operator's manual.
- If manual is lost, contact your nearest dealer for a new manual.

D001-033

D001-033



D001-225

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1. RoboMax System Control Panel.
- Operating Screens can be called up for each sequence of operation.
  See following pages.

2. System Power '**ON-OFF**' Switch.

3. Emergency '**STOP**' - Push to '**STOP**'.
- Pull to '**RESET**'.

3a. The '**outside**' E-STOP is located at the right hand side, below the Roll-Up Drive Cover.

4. Tractor Command Center Panel.

5. Console Switches. See page 2-02.
Some machines have Levers in place of Switches.

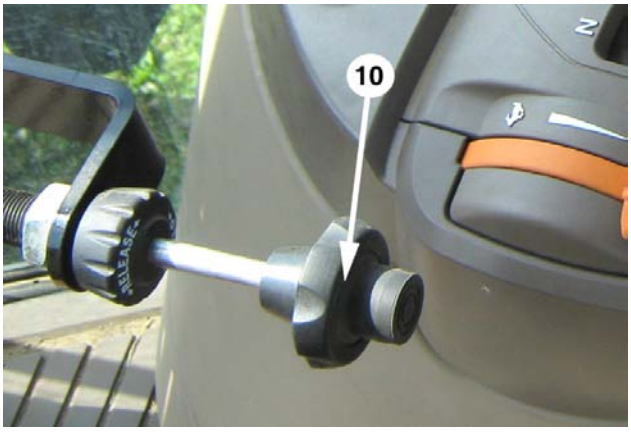
6. Control Handle. See page 2-02.

7. Transmission 'Range/Gear Selection' Lever.

8. Cutter Speed Control.

9. Conveyor Speed Control.

10. Auto-Steer Fine Adjust Control. See Section 6.



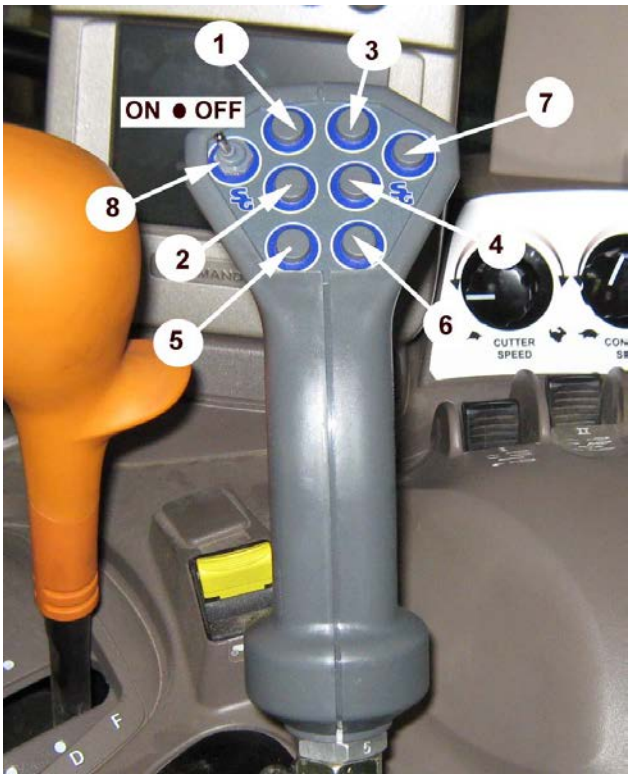
CAB CONTROLS

Control Handle.

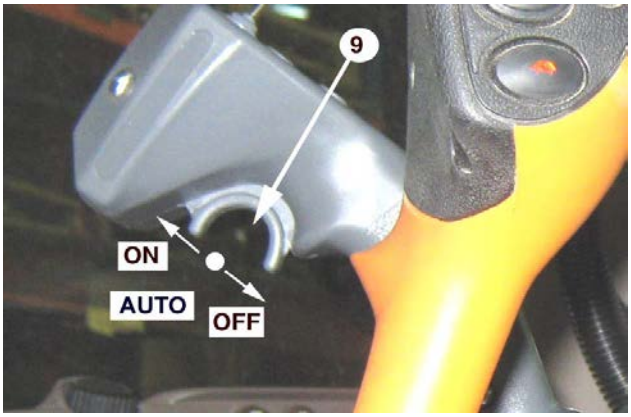
The Control Handle allows easy operation of the following functions:

1. Roll Eject –Tooth Count Increase.
2. Roll Eject –Tooth Count Decrease
3. Roll Size – Increase.
4. Roll Size – Decrease.
5. Cutter - '**ON-OFF**'.
6. Conveyor - '**ON**–**OFF**'
7. Bad Roll Eject
8. Auto-Steer - '**ON-OFF**' Switch.
9. Trigger - Auto System - '**ON** –**OFF**'

Note: Some machines have the Cutter Head and Depth Controls as shown above.



Control Handle.



Trigger - Auto System 'ON-OFF'.

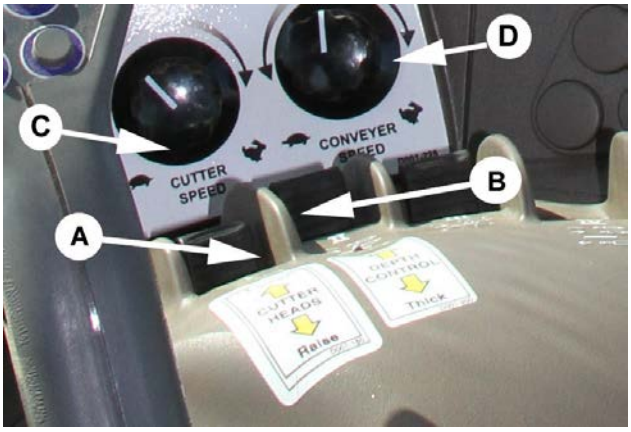
Cab Console Switches.

The Switches located on the console, to the right of the operator, are:

- Switch '**A**' - Cutter Head '**Lift–Lower**'.
- Switch '**B**' - Depth Control '**Thick-Thin**'

Some machines have Levers in place of Switches 'A' & 'B'.

- Rotary Switch '**C**' – Cutter Speed
- Rotary Switch '**D**' – Conveyor Speed.



Console Switches.

Control Panel Screens.

Initial Start Screen.

The Initial Start Screen is displayed when the tractor ignition key is switched to '**ON',** and the Robomax System Switch '**A**' is switched to **'ON'.**

- **After** the flashing red '**WAIT,**' in top left corner '**stops**', press Pad '**1**', to start the Controller and bring up the Stacking Pattern Selection Screen.

Initial 'START' Screen.

Stacking Pattern Selection Screen.

The Stacking Pattern Selection Screen, allows the operator to select the number of rolls on each pallet.

- Press the left arrowed pad '**A**' **(prev),** or the right arrowed pad '**B**' **(next)**, to toggle between the selections.
- Press Pad '**1**' **(start)**, to bring up the '**Inactive Stacking Screen'.**
- Press Pad '**8**' to go to Configuration Sub-Screen. See following page.

Stacking Pattern Selection Screen

Inactive Stacking Screen – RED.

- Press Pad 1 to go GREEN
- Press '**A**' to return to above screen

Inactive Stacking Screen – Start 'RED'..

Inactive Stacking Screen – GREEN'.

- Press Pad 1. Select Screens. 'GREEN'.
- Select 'AUTO'. – Control Handle Trigger.

Inactive Stacking Screen – Start 'GREEN'.

Configuration Sub-Screen.

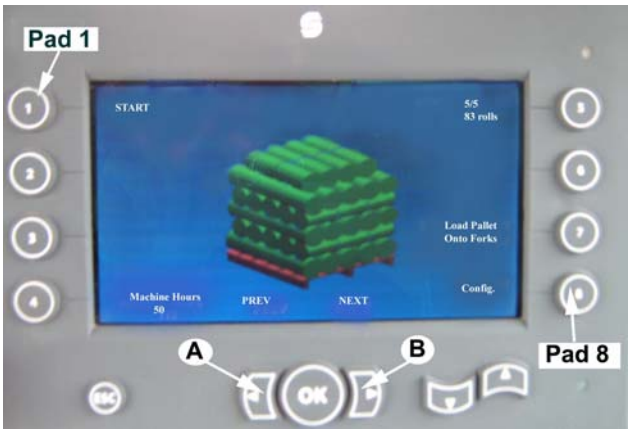
- Press Pad '**8**' to select Index Tooth Count. Adjust with Arrows '**A**' and '**B**'.
- Press Pad '**8**' for '**Cut-Length**' selection. Adjust with Arrows '**A**' and '**B**'.
- Press Pad '**8**' for Pallet Insert Mode. Use Arrows '**A**' and '**B**' to select 'Auto' or 'Manual' mode.
- Press Pad '**8**' to select Bad Roll Differential Percent. To adjust the Differential press Arrows '**A**' or '**B**'.
- Press Pad '**5'**. Enables Load Forks Stacking Position.
- Press Pad '**C**' (**ESC**) to close and return to selection screen

Configuration Sub-Screen

Stacking Pattern Selection Screen.

The Stacking Pattern Selection Screen allows the operator to select the Number of rolls on each pallet.

- Press the left arrowed Pad '**A**' (**previous**), or the right arrowed Pad '**B**' (**next**), to toggle between the selections.
- Press Pad '**1**' (**Start**), to bring up the '**Inactive Stacking Screen** '.
- Press Pad '**8**' to go to Configuration Sub-Screen.



Stacking Pattern Selection Screen.

Inactive Stacking Screen.

Inactive Stacking Screen is displayed during Initial Start Up. There is a **90 second delay** before **Pad 2 (Move Manually)** is **'Active'.**

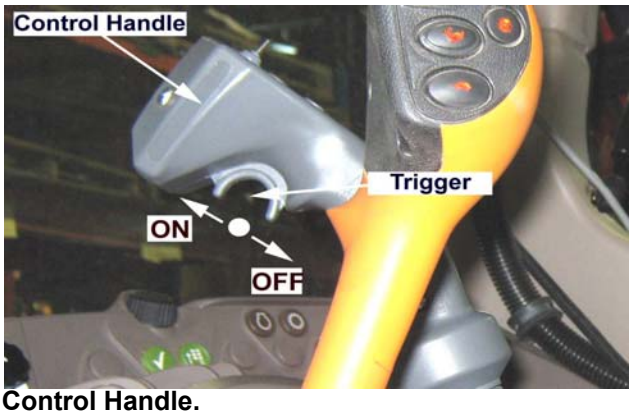
IMPORTANT

Do not press any Control Panel Pads until the Active Stacking Screen is displayed.

The Inactive Stacking Screen will also be displayed when the stacking sequence has stopped.

- Press Pad '**1**' (start) to go Green '**READY**'.

To activate Pad '**2**', **press Pad '1' once to go 'READY',** and **'push '** Trigger on Control Handle to go **'AUTO'.** Squeeze Trigger to '**STOP**'. See page 2-02.



Control Handle.

WARNING

To prevent possible injury or damage to the machine, activating Pad '**1**' **must only be done** when the Gripper Head is over the Index Conveyor and the Roll Count is not greater than six.

- Press Pad '**3**' **and hold for 3 seconds,** to reset the Pallet Counter to zero.
- Press Pad '**4**' to indicate a new pallet. '**Empty Pallet**' will be displayed, and the pallet roll quantity will reset to zero.
  (The forks will not move in '**Inactive Screen**'.
- Press Pad '**8**' to highlight 'Down pressure'. Adjust with up-down arrows '**A**' and '**B**'.
- Press Pad '**1**' – **RED** Indicator will change to **GREEN**.

Inactive Stacking Screen

Control Panel Screens.

When first starting operation, i.e. when '**COLD**'.
Press **Pad** '**1**' to go Green '**READY**',

IMPORTANT

The Eject Tooth Count, Index Tooth Count and Bad Roll Corr' when added together **must be zero or greater**. If not the screen will display '**Constrain Value** '. It will require the Bad Roll Correction value to be adjusted to arrive at zero or greater.

- Press '**C**' – Return to Stacking Pallet Selection Screen.
- Hold Pad '**7'** for 2 seconds to insert pallet onto forks.

Pallet Position Auto Setting.

- Press Pad '**1**' on Stacking Pattern Selection Screen, return to this screen.
- Press Pad '**8**' to highlight Down Pressure. Adjust with Arrows '**A**' and '**B**'.
- Operate the Trigger on the Control Handle to go the '**Auto Mode**'. See below.
- Press Pad 7 – to hold the Auto Inject sequence. ie. when reversing to drop the pallet off the cut line. Press Pad 7 again to release pallet injector.

Pallet Position 'Auto' Setting

Pallet Lift Forks 'Cycling'.

- This Screen will appear and the Pallet Lift Forks will cycle '**UP** and '**DOWN**', to automatically set in their correct position.

- The Cutter starts.
  The Conveyor starts.

Pallet Lift Forks 'Cycling'

Active Stacking Mode Screen.

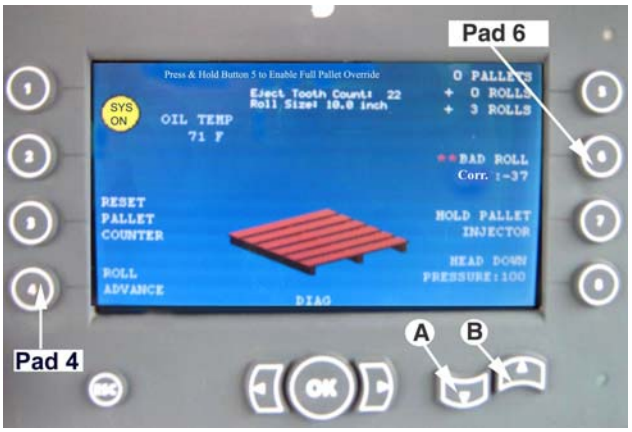
- The Roll Size and Roll Eject Tooth Count are adjusted on the Control Handle. See page 2-02.

- Press Pad '**4**' to advance the Index Conveyor '**one**' position.

Can also be advanced with Control Handle Trigger. Push '**ON**' See below.

- When the Pallet is approaching '**FULL**', the Warning Lamp will start flashing and the 'beeper' will sound.

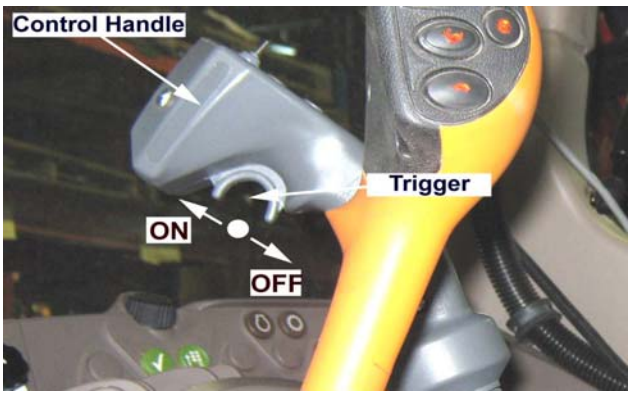
- Press Pad '**6**' for Bad Roll Correction
  Press 'Up' Arrow '**A**' and 'Down' Arrow '**B**'.



Active Stacking Mode

NOTE

The harvesting operation is automatic. However, if it is necessary to stop the Auto Mode, the Trigger on the Control Handle must be used.



Control Handle.

CAB CONTROLS

Manual Mode Screen.

CAUTION

Arrows '**C**' and '**D**' (See below on Control Panel) will adjust the movement of the Arm, but it is recommended that the Control Valve Levers are used for this purpose.

IMPORTANT

The manual operation of the Control Valves Levers must only be done during service, to check the operation of the Arm or other functions.

OR:

If a cylinder fails, or some other malfunction occurs, in mid operation, the operator can use the appropriate lever to return the Arm to its proper position, i.e. over the Index Conveyor.

The Cutter Head Control Valve, **10,** (located on the right hand side, forward of the cab door), is connected to the tractor power beyond hydraulics.

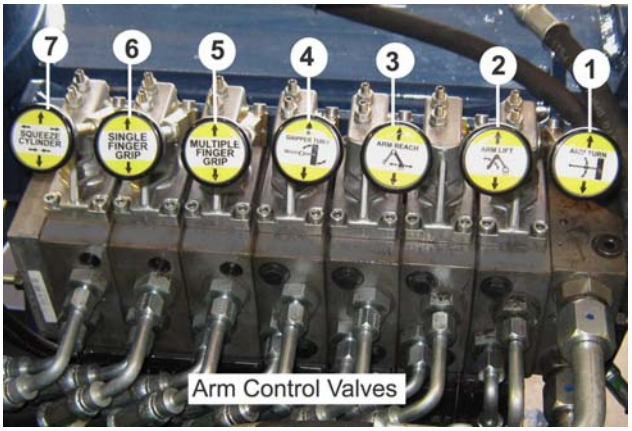
WARNING

To prevent possible serious injury, do not operate the Cutter Head Control Valve **manually, at any time.**

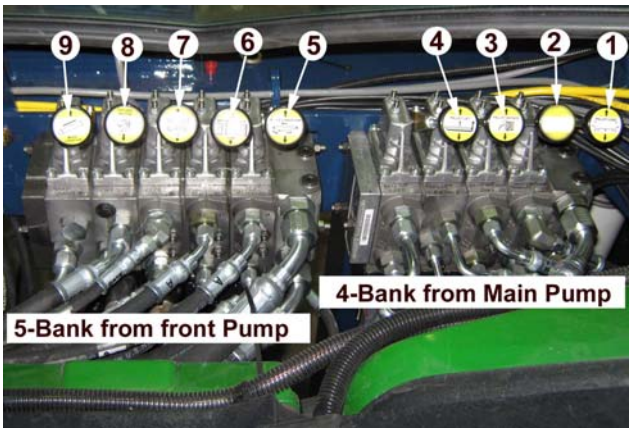
Before proceeding with the instructions below, squeeze the Control Handle Trigger and hold for two seconds. See page 2-05.

Pallet Forks 'Up'-'Down', Gate 'Open - Close', and Gripper Turn functions.

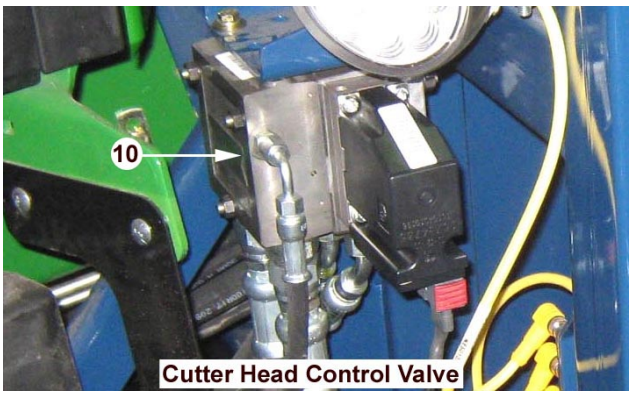
- Press **Pad '1'** (**OK**), to return to the **Inactive Pallet Full Screen**, or the **Inactive Stacking Screen.**
- Press **Pad** '**3'** ('**UP**') to **'raise' the Pallet Lift Forks.**
- Press **Pad '4'** (**DOWN**) to **'lower' the Pallet Lift Forks.**
- Press : **Pad** '**7**' to '**open**' Rear Gate.
  Pad '**8**' to '**close**' Rear Gate.
- Press Arrow '**A**' or '**B**' to scroll between '**X**', '**Y**', '**Z**', and Gripper Turn. Use Arrows '**C**' and '**D**' to increase or decrease values.
- Press Pad '**1**' to return to Inactive Stacking Screen

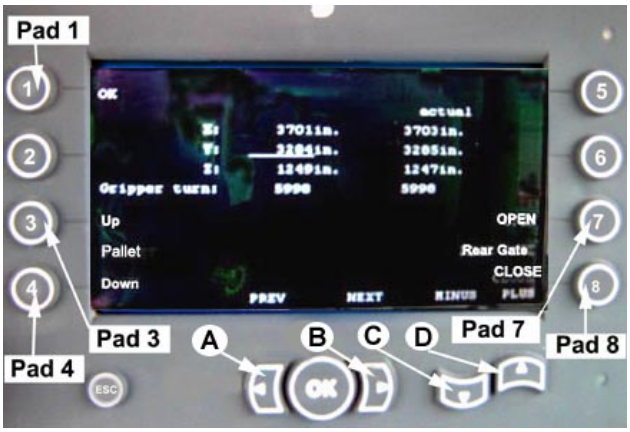


1. Arm Rotate **2.** Arm Lift. **3.** Arm Reach. 4. Gripper Turn. **5.** Multi Finger Grip. **6.** Single Finger Grip. **7.** Squeeze.



1. Load. **2.** Drop. **3.** Pallet 'Rotate'. **4.** Forks. **5** Index Conveyor. **6.** Eject. **7.** Gate. **8**. Cut-Off. **9**. Main Conveyor.





Lift Forks 'UP-Down'. Gate 'Open-Close'.

Step Sequence Screen.

Before proceeding with the instructions below, squeeze the Control Handle Trigger and hold for two seconds.

The **Step Sequence Screen** is displayed when the **Step Sequence Pad** '**OK**', on the Inactive Stacking Screen is Pressed**.**

- Press **Pad** '**1**' to return to the **Inactive Stacking Screen.**
- Press the '**Left Arrow Pad**' '**A** (**prev**.) to **remove five sod rolls** from the pallet display. In some cases this may be four rolls.
- Press the '**Right Arrow Pad**' '**B**' (**next**), to **add five sod rolls** to the pallet display.
- Press the '**UP**' **Arrow Pad** '**C**' (**plus**) to **add** sod rolls to the **Index Conveyor Count.**
- Press the '**DOWN**' **Arrow Pad** '**D**' (**minus**) to **subtract** sod rolls from the **Index Conveyor Count.**

Step Sequence Screen

Active Pallet 'FULL' Screen.

The '**Active Pallet Full**' Screen is automatically displayed when the pallet is completed.

- Press Pad '**1**' to display **Inactive Pallet Screen.**

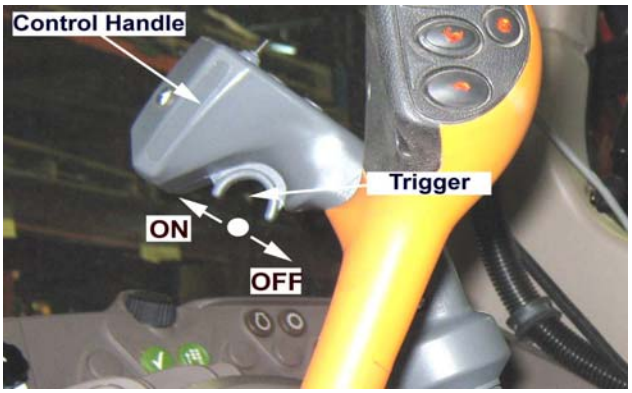
Active Pallet 'FULL' Screen

Inactive Pallet Full Screen.

The Inactive Pallet Full Screen is displayed when the Trigger on the Control Handle is 'squeezed'.

- Press Arrow '**A**' to raise the Pallet Forks.
- Press Arrow '**B**' to lower the Pallet Forks.
- Drive clear of the pallet, then press Pad '**7**' to initiate the **Pallet Dispense Sequence.**
- Press Pad **'3'** to reset the Pallet Counter to '**zero**', if necessary.
- Press Pad '**4**' to indicate a new pallet. An empty Pallet will be displayed and Pallet Roll 'quantity' is reset to 'zero'. The pallet will not '**raise**' until you proceed to '**Active Screen**'.
- Press Pad **'1'** to go green **'READY',** then push the Trigger on the Control Handle to go '**AUTO**'

Inactive Pallet 'FULL' Screen.



SECTION 3

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Recommended Harvesting Speed.

CAUTION

The operator must read the Tractor Operator's Manual to familiarize himself with the operation of the tractor controls.

IMPORTANT

For optimum harvesting efficiency and fuel consumption, the ideal transmission gear and engine speed selections are programmed into the Command Center.
To make changes to the program only trained Technicians must access the Command Center System.

OPERATION.

- With the Reverser Lever in the neutral position, and the Range Shift Lever in '**NEUTRAL**'
- Depress the Clutch Pedal and start the engine.
- With Range Shift Lever : Select '**A – Range**'.
- Move Reverser Lever to '**Forward**'.
- With the gear select button on the Range Shift Lever, **select 3rd. Gear.**
- Slowly release the Clutch Pedal.

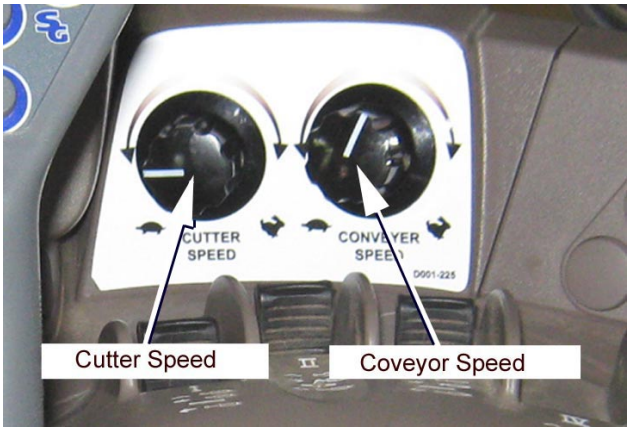
Smoother operation is attained using the clutch pedal, rather than the hand clutch button on the Range Shift Lever.

CUTTER BLADE.
To reduce 'shock loads' to the Cutter Motor, when starting to harvest, the Cutter Blade should be started **before** the Cutter Head is lowered to the ground.

CUTTER BLADE –SPEED SETTING.
For best results, start cutting at the maximum speed and work back to the lowest speed that gives the best results. Lower cutter speed results in less vibration.

The tractor ground speed may have to be reduce when Harvesting in rough or stony ground to avoid possible damage to the cutting components.

MAIN CONVEYOR SPEED.
The Main Conveyor speed should be adjusted to provide a space of four to six inches between the sod pieces as they travel up the conveyor. This initiates the actuation of the Index Conveyor Sensor.
If the Space between the sod pieces is less than four inches the sensor may not 'see' the end of the sod piece.



NOTE

It may be necessary to adjust the Main Conveyor speed as the hydraulic oil reaches full operating temperature.

When setting the Main Conveyor Speed, operate the tractor in the gear selection and engine RPM that will be used when harvesting.

To maintain proper spacing between the sod pieces on the conveyor, keep a constant travel speed.

OPERATION
Main Conveyor

WARNING

Safety Guards may have been removed for clarity.
Do not operate the Harvester with safety guards missing or damaged.
To do so could result in serious personal injury.

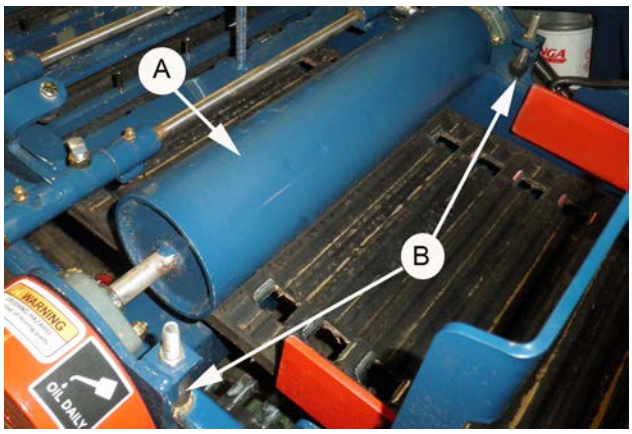
WARNING

To prevent possible serious injury: No one should step on the conveyor, or attempt to free any jammed turf rolls or debris, while the engine is running.

4-inch Feed Roller
The 4 inch Roller **'A'** assists in feeding the sod into the Starter Gate. It should be kept free of grass and mud to maintain proper operation.
The Roller is driven by the Mid-Idler Sprocket Shaft that supports the Main Conveyor Mat.

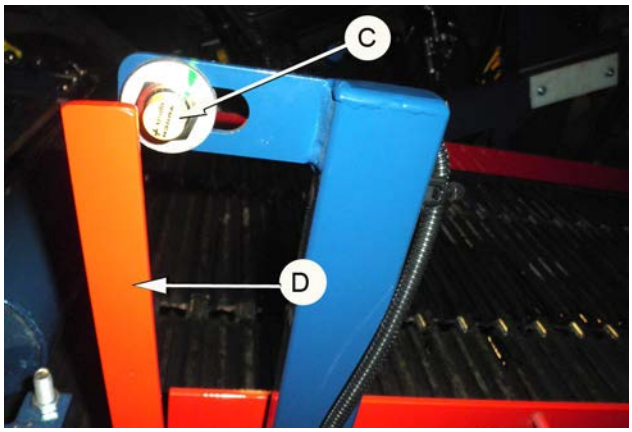
To adjust the Roller:

- Place a piece of sod under the Roller. With the Roller resting on the sod, adjust the Bump Stops **'B'** until there is 1/8 inch clearance between the Bump Stops and the Frame.
  For weak, or thin turf, requiring less roller pressure, adjust the Bump Stops **'down'**, onto the frame, raising the Roller and reducing the pressure on the turf.



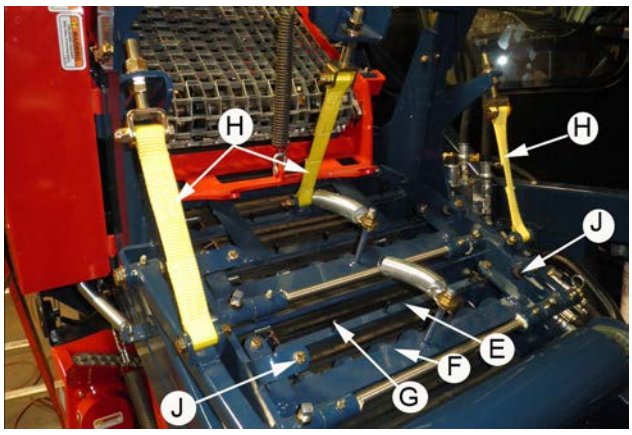
Slab End Sensor.
When the end of a slab of sod passes under the 4 inch Roller, the Arm '**D**' passes across Sensor '**C**'.
This signals the computer to:

- count the number of teeth, ('tooth count'), that the operator has pre-set
- 'stop' the Roll Eject Mat, (that ejects the scrap Roll).



Starter Gates.
The Starter Tray Bars **'E'**, behind the Starter Gates '**F**', have Pins '**G**' that protrude 1/4 inch below the Bar.
The pins grip the turf as it starts to 'roll-up'.
If the turf passes through, but does not 'roll-up', tap the pins **'IN'** until they protrude 1/2 to 5/8 in.
The pins wear with use and must be adjusted or re-placed as required.
In tender sod the pins may hold the underside of the sod too long, causing a loose roll, incorrect roll flap position, or partially rolled 'incomplete' rolls, in this case the pins should be 'raised'. Trial will determine the best pin positions.
If the sod passes through the first starter gate the second one will 'catch' it.

- Maintain 4 to 6 inches between the sod pieces on the Conveyor.
- Do not allow dirt to build up on the Conveyor, it will cause the Starter Gate to open early.

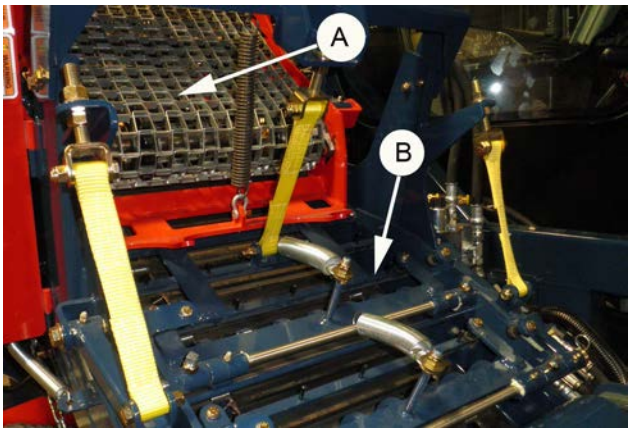


The Starter Gates **'F'** must be positioned approximately 1/8 inch clear of the Conveyor Mat, measure at the join 'splice' in the Mat, ie. **its thickest point.**
Gate clearances are set with the adjustable straps **'H'.**
The Gate must not touch the mat.
The Starter Gate Stops **'J',** prevent the bottom edge of the Gates lifting higher than the top face of the Bars '**E**'.

Roll-Up Conveyor

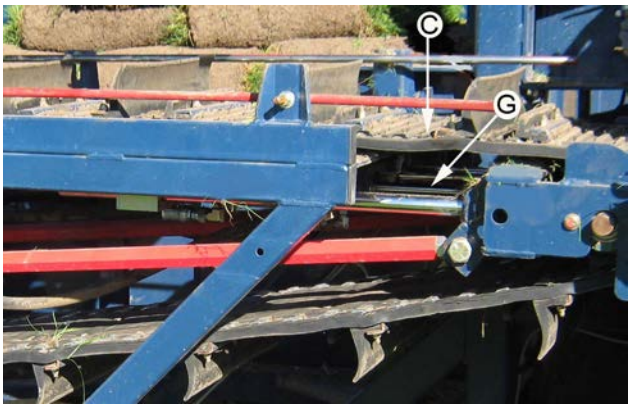
The Roll–Up Conveyor **'A',** continues the Roll–Up action after the Roll has passed through the Starter Tray **'B'**.
It is chain driven from the Main Conveyor.

Adjust the Hanger Chain to allow 2 to 2 ½ inches clearance between the bottom of the Roll-Up Frame and the Starter Tray.



Index Conveyor

The Index Conveyor '**C**' is driven by Hydraulic Motor. It is synchronized to the Main Conveyor, Robo Arm and Bad Roll 'Ejection' Cylinder '**G**'.
When a Roll is ready to be deposited onto the Index Conveyor, a signal from the Controller causes the Index Conveyor to roll back 'one position' to accept the completed roll.

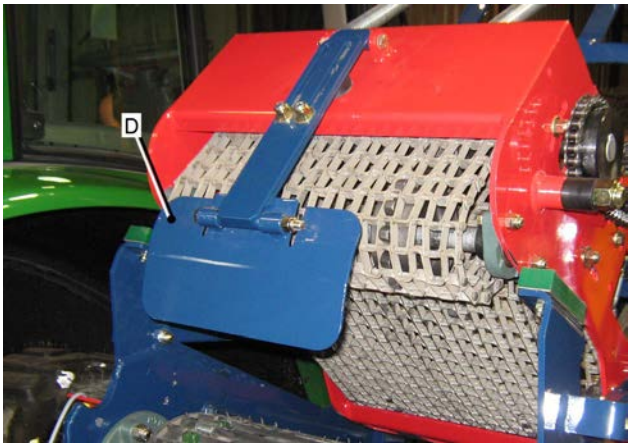


WARNING

Do not attempt to clear jammed rolls or debris while the machine is running. Keep all bystanders well clear of the Index Conveyor, Gripper Head and Pallet Gate and Injection area.

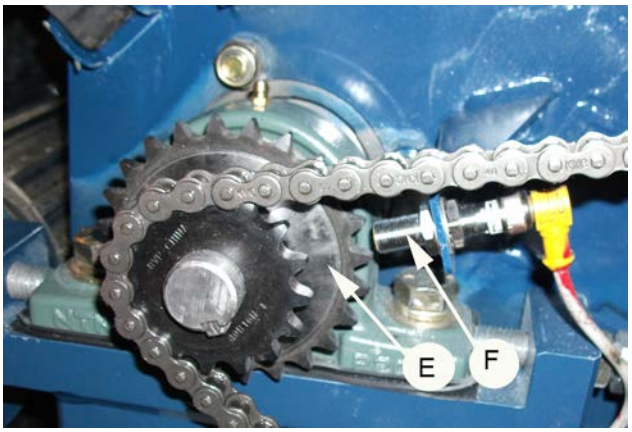
Roll Flap 'Stabilizer'

The Roll Flap 'Stabilizer' '**D**', holds the sod roll as it is transferred to the Index Conveyor. The position of the Roll Flap is controlled by setting the 'tooth count, using the '**+**' and '**–**' Buttons on the Control Panel LED Display, (see page 2-1).
The 'teeth' are on Sprocket '**E**', located at the right rear of the Main Conveyor. The' tooth count' is by Proximity Sensor '**F**'.
Increasing the 'tooth count' moves the Roll Flap 'counter clockwise'
Decreasing the 'tooth count' moves the Roll Flap 'clockwise'
Adjust the Roll Stabilizer location to suit the selected position of the Roll Flap.



IMPORTANT

The Roll Flap Stabilizer must be set to 'just' hold the Roll. **It must not 'compress' it.**

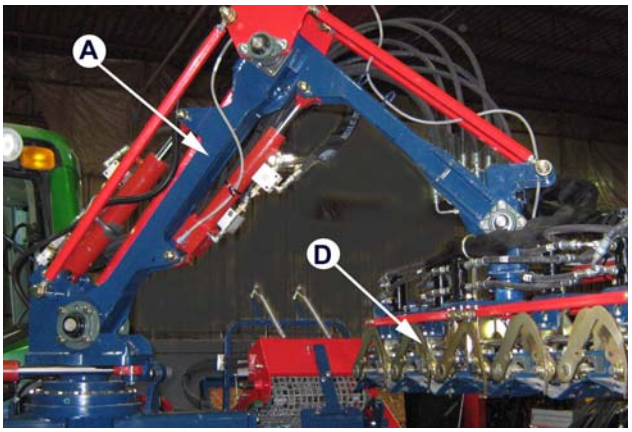


Bad Roll Ejection

To '**eject**' a bad roll of sod, the Index Conveyor is moved back, by Cylinder '**G**', and held in that position, allowing the Roll to drop past the Conveyor to the ground.
To activate the Roll Ejection refer to the Controls Section, page 2-5.

Robotic Arm and Gripper Head

The hydraulic functions of the Robotic Arm **'A'** are controlled by one of three Controllers in the Main Control Box, through Proportional (PVG) Valves. See Section 5.
The 7-Bank Arm Control Valves '**B**', are located immediately to the rear of the cab window.

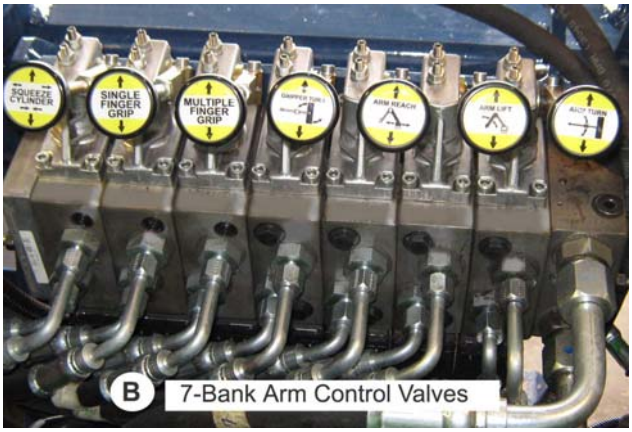


The relevant Controller provides positioning co-ordinates for:

- Robotic Arm Lift
- Robotic Arm Reach
- Robotic Arm Rotation
- Gripper Head Rotation

The Robotic Arm, responding to the Controller commands, picks up and transfers the rolls from the Index Conveyor '**C**', to the Pallet.

NOTE
Refer to page 2-06 for lever functions.



Gripper Head

The Controller also controls :

- the manipulation and 'squeeze' functions and of the Gripper Fingers '**D**'.

Pallet Lift Forks

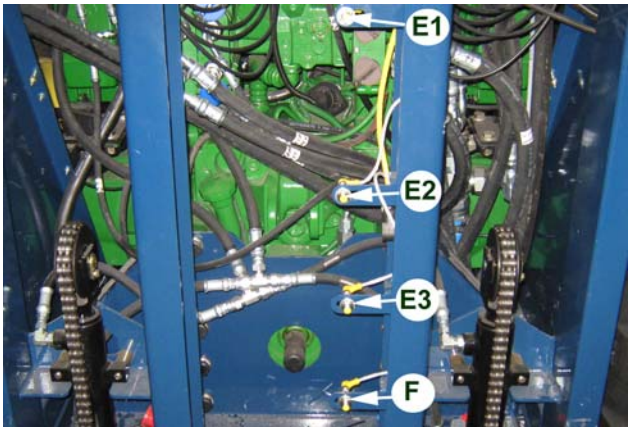
The Pallet Lift Forks lower automatically, (by the Controller), as layers of sod are added to the pallet.

When stacking is complete the loaded pallet is lowered to the ground.

There are three Proximity Sensors that sense the three programmed positions of the Lift Forks.

- In the **'upper'** position '**E1,**' two layers are placed on the pallet.
- In the **'middle'** position '**E2'**, one layer is added.
- In the **'lower'** position '**E3**', the remaining layers are added.

- Sensor, '**F'**, is for the Pallet Insert function.



Pallet Dispenser.

DANGER

Keep all bystanders clear, do not allow anyone to enter between the Pallet Dispenser and the Harvester. **To do so could result in serious injury or death.**

Operating Position
The Pallet Dispenser holds up to 15 pallets for transfer to the Lift Forks.

Pallet placement is controlled by the operator with 'inputs' on the cab control panel. (Controller 'A'). (See Controls Section page 2-07).

Pallet 'transfer' is by hydraulic cylinders.
The cylinders are controlled through Controller 'C' and Proximity Sensors.

Pallet Dispenser – Operating Position

Stowed Position
The Pallet Dispenser Assembly can be 'manually' rotated, from its operating position to a 'stowed' position. This reduces the width of the machine when shipping or transporting.

WARNING

Crushing Hazard. To prevent possible personal injury, when changing the Pallet Injector from the Operating to the Stowed position, the machine must be on level ground to prevent the assembly inadvertently swinging closed.

Pallet Dispenser – 'Stowed Position'.

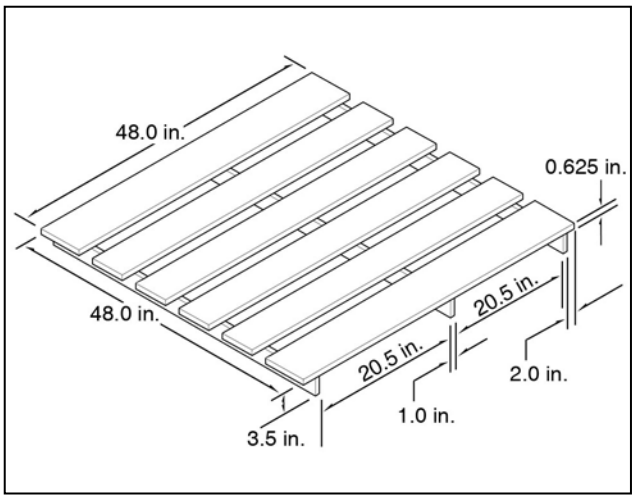
Pallet Specifications
Standard Pallet.

IMPORTANT

To ensure proper operation of the Pallet Dispenser, pallets must conform to the dimensions shown**.**

They must be in good condition, with no loose or damaged boards.

Pallets must be able to support 4000 lbs.



Pallet Specifications

OPERATION

Pre-operation and Warm-Up procedure.

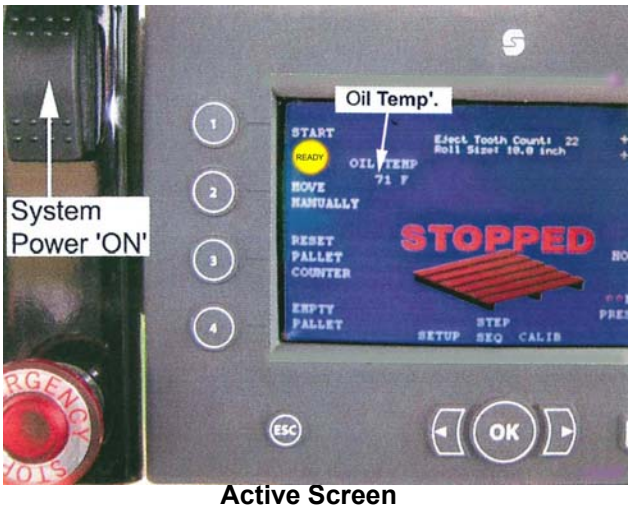
DANGER

When carrying out the following procedures all bystanders *MUST BE KEPT CLEAR* of the machine. Failure to observe this precaution could result in serious injury or death.

IMPORTANT

Before operating the machine for harvesting it is important that the Hydraulic Oil is brought up to operating temperature. If the ambient temperature is **below 75 deg. F,** proceed as follows.

- Start the Tractor Engine and switch the System Power **'ON'**.
- Allow the Hydraulic Pumps to operate and circulate oil through the system.
- Go to '**ACTIVE**' Screen.
- Run the Main Conveyor for several minutes to help circulate the oil, until the normal oil operating temperature is indicated on the temperature read-out on the Control Panel Screen.



Active Screen

CAUTION

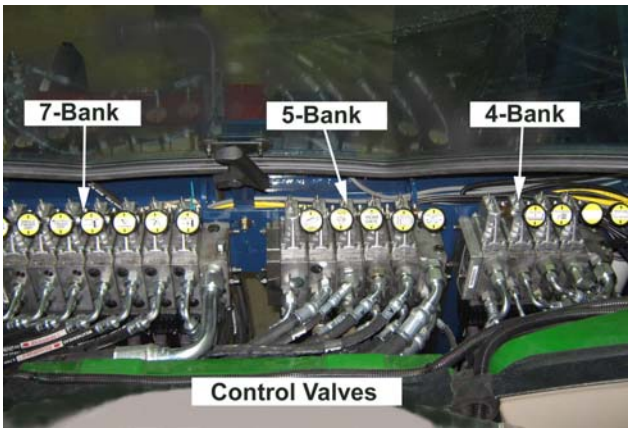
To prevent damage to the Cut–off mechanism the Cut–off **must only be operated when the machine is harvesting.**

The above procedure will:

- Ensure that the machine will function efficiently, with the Hydraulic Oil at the correct temperature.
- Prevent possible damage to components due to cold hydraulic oil.
- Serve to check that the machine is properly 'set-up' ready to operate.
- Enable a check to be made for oil leaks.

WARNING

If the Control Valves Manual Control Levers, located behind the cab window, must be used to check the operation of a function during service procedures, **the operator must ensure that all persons are kept well clear of the machine. Failure to do so could result in serious injury or death.**



Operating Instructions.

NOTE

Refer to the Controls Section for the 'Controls Functions' instructions.

CAUTION

Before starting to cut the field, ensure that all by-standers are clear of the area, and that there are no foreign objects or obstacles that may possibly cause an accident.

- Put the Reverser Lever and Range Shift lever in **'Neutral'.**
- Depress the clutch pedal and start the engine.
- Select '**A**' Range with Range Shift Lever.
- Move Reverser Lever to '**FORWARD**'.
- **Select 3rd Gear** with the Selector Button on the Range Lever.
- Slowly release the Clutch Pedal.

NOTE

Smoother operation is attained using the clutch pedal, rather than the clutch button on the Range Shift Lever.

NOTE

If there is a 'pause' during the engine start pre-setting action, it will result in the Controller and the Control Display to go to the 'Initial Start' sequence twice. If this occurs they may get out of 'synch', and it will be necessary to repeat the engine start procedure.

- Switch Main System to '**ON**". This will '**enable**' the harvester functions, except : Travel, Depth of Cut and Cutter Head Position.
- Press **Pad '1'** on the Initial Start Screen, to start the Controller. The Stacking Pattern Selection will then be displayed on the screen.
- Inject a Pallet onto the forks.
- To select the required Stacking Pattern press the **'Prev'** or **'Next'** Pads.

NOTE

There are four 'standard' patterns.

IMPORTANT

When the **'Active'** Screen is displayed you can prepare to start harvesting. If the field has not been previously cut, it will be necessary to cut a strip in the **'manual'** mode to create the edge for the Auto-Steer Guide Shoe to work against.
The initial strip **must be cut straight** to ensure that the Auto-Steer operates properly.
Refer to Auto-Steer Section

- Lower the Cutter Head.
- Increase engine speed to1800RPM **maximum**, to ensure sufficient hydraulic oil flow.
  1800 RPM should be the engine speed when harvesting.
- Start the Cutter/Conveyor operation with the Switch on the Control Handle.
- Adjust the Main Conveyor speed.

The speed of the Main Conveyor must be adjusted relative to the ground travel speed.

Adjust the Conveyor speed to provide 4 to 6 inches between the sod pieces on the conveyor.

Tooth Count recommended starting point:

The Tooth Count for the Index Conveyor also has to be adjusted, relative to the ground travel speed, to ensure that the Roll Flap is positioned correctly.

To start set the Tooth count at 22 Teeth and adjust as necessary to obtain the correct Roll Flap position.

The above settings may require adjustment, depending on prevailing ground conditions.

Transmission Operating Ranges and Gear Selection.

See page 3-01 for recommended harvesting speed.

- Select the required transmission configuration, using the **'Range Shift Lever** and **Gear Select Button' 'A'**, located to the right of the operator's seat.

- Move the Reverser Lever '**B**', to the '**forward**' position.
- Release the Clutch Pedal. The Machine will move forward and the Cutter Head will be operating.
- Adjust the sod thickness with the Depth of Cut pads on the Control Handle.

At this point the Rolling and Stacking process is automatic. Adjust the sod to the thickness required, while harvesting.

Defective Roll Ejection.

Defective rolls of sod can be '**ejected**' by pressing **Pad '7' (Roll Eject)** on the Control Handle**.** It must be pressed after the Roll has been placed, and the Index Conveyor has stopped but before the next Roll enters the Roll-up Conveyor.
The Index Conveyor moves **'back'** allowing the defective roll to drop to the ground.
The Index Conveyor will remain **'back'** until the next roll is ready to be placed on it, it then moves **'forward'** automatically.

NOTE

If there are areas of poor sod, or strips, that do not require stacking, the Index Conveyor can be held in the **'back'** position allowing the sod to fall to the ground.
To hold the Conveyor **'back'**, press **Pad '7',** this will stop the stacking sequence and prevent the Controller from sensing the ends of the Rolls or Strips. Release Pad '**7**' to resume harvesting.

Stacking Sequence.

IMPORTANT

Do not 'stop' or **'slow'** the engine while stacking

When the 40, 50, 60 or 70th Roll, depending on the pallet stack selected, is picked from the Index Conveyor, five more rolls are needed to finish the pallet. A warning lamp '**blinks'** when there are three more rolls to go.
When the 5th piece of sod is cut and starts up the Main Conveyor the operator must **'stop'** the **'forward'** travel of the harvester.
The Robotic Arm picks up the rolls for the last layer after the 5th Roll is placed on the Index Conveyor.

Pallet Full and Insert new Pallet.

After 44, 54, 64 or 74 Rolls, depending on the pallet stack selected, have been stacked on the pallet, the **'Pallet Full' Screen** is displayed. Press the **'Right Arrow' Pad (Pallet Down)** to lower the completed pallet to the ground. When the pallet is on the ground, continue cutting (two more cuts),until the pallet is clear of the Lift Forks. Stop the harvester and press the '**stop'** Pad.
Refer to page 2-9 for the Pallet Dispense sequence.

Stopping the Stacking Sequence.
To stop the stacking sequence:

- Press the **Trigger**, on the **Control Handle**.
  See page 2-02

It is recommended that the Stacking Sequence is stopped **after** the Robotic Arm has placed the Rolls on the Pallet and returned to the **'home'** position over the Index Conveyor. This allows the Controller to count the completed rolls.
If the stacking sequence is stopped, before the Robotic Arm has completed the stacking cycle, the Robotic Arm will not return to the '**home**' position.
If necessary the Robotic Arm **must be moved manually,** over the Index Conveyor.
After restarting the stacking sequence, the rolls that were being stacked may be scattered when the Arm returns to the '**home**' position, it will then be necessary to manually adjust the roll count on the display.

Inactive Stacking Screen.
Push the Trigger on the Control Handle, the Inactive Stacking Screen will appear on the Control Panel.

Inactive Stacking Screen

IMPORTANT

If there were 15 Rolls on the Pallet, and the Robotic Arm action was stopped at the mid point of stacking Rolls 16 to 20, after the sequence was re-started, and Rolls 16 to 20 were manually placed on the pallet, it would be necessary to go to 'Step Sequence', and press the 'Next' Pad to add rolls 16 to 20 to the pallet.

If 'forward travel' was stopped, after the stacking sequence was stopped, it may be necessary to 'manually' adjust the number of Rolls on the Index Conveyor.
The Rolls will have to be manually re-positioned on the Index Conveyor because the Index Conveyor will not move **'back'** when the Stacking Sequence is stopped.

After the Rolls are positioned correctly on the Index Conveyor, return to the **'Step Sequence Screen'** and use the **'Up'** and **'Down' Arrow Pads** to adjust the number of Rolls on the Index Conveyor, indicated by **'Plus'** and **'Minus'** on the Screen.
Use the **'Up' Arrow (Plus)**, and the **'Down' Arrow (Minus),** to adjust the number of Rolls shown on the Screen Display, until they match the number of rolls on the Index Conveyor.
When the number of Rolls on the Screen Display, the Index Conveyor and the Pallet are the same, the Stacking Sequence can be re-started.

If the Stacking Cycle was stopped after the Robotic Arm had completed its cycle and returned to the '**Home**' position, over the Index Conveyor:

- Press **Pad '1' (Start),** on the Inactive Stacking Screen to go to Green '**READY**', then push the Trigger on the Control Handle to go to **Active Stacking Screen.**

Partial Pallet
If a 'partial pallet' is required, that is a pallet with less rolls than the selected stacking pattern, follow the recommended procedure below :

- When the rolls required for the 'partial pallet' are on the pallet, stop the 'forward travel' of the harvester.

Press and **'Hold' Pad '5',** for **'Full Pallet'** Screen, and then proceed normal operation.

Suggestions for better 'Stacking'.

To ensure that the customer has reliable and user friendly automatic machines, Brouwer incorporates the latest technology for mobile equipment in the electronic and hydraulic systems on its harvesters.
The operation of the Robomax Harvester is straight forward, however, variations in sod rolls and in the local field conditions, require that the operator is aware at all times of such variations.
The following suggestions will help the operator to 'stack' consistent pallets of sod.

The 'integrity' of a stacked pallet of sod depends on the consistency and quality of the sod rolls. Poor quality rolls result in pallets with low integrity.
It is important that the operator maintains roll consistency and grades the rolls as they are harvested.
Inferior rolls should be 'ejected' before the rolls are on the Index Conveyor.

- The diameter of the Rolls, and their vertical stacking position on the pallet are related.
  To stack a pallet correctly, the Gripper Head should come 'down' to just touch the rolls on the Index Conveyor, **before** the Gripper Fingers 'close' to 'grab' the rolls.
  This pick-up height is adjusted by selecting the correct roll size on the display screen.
- Selecting a roll size that is 'too small' commands the Robotic Arm to compress the rolls as they are picked from the Index Conveyor and transferred to the pallet.
  Compression of the rolls when being stacked results in increased cycle times and reduced efficiency.

- Selecting 'too large' roll size results in the rolls being 'dropped' onto the pallet. This leads to pallets with less than the desired integrity.

Adjustments can be made to the 'stacking positions'.

To determine if adjustment is necessary:

- Harvest at least five pallets of sod, noting the specific stacking position that may require adjusting. If the five pallets show the same stacking inconsistency, stacking position adjustment is necessary.
  Consult your Brouwer Dealer, or the Factory, for advice on this procedure.

SECTION 4
Maintenance.

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Pallet Lift Forks Sensors. 4-24

Maintenance Procedures.	DAILY	After first 25 hours	Every 50 hours	Every 100 hours
ENGINE. Important: Refer to the tractor Manufacturers Manual for full maintenance/service instructions.				
Check/Top-off Engine Oil Level.	X	**Refer to the Tractor Manual for:** Air Cleaner Pre-cleaner; Air Cleaner Element, Engine Oil and Oil Filter change. Battery maintenance.		
Check/Top-off Engine Coolant Level.	X			
Check for Water/Oil Leaks.	X			
Clean Air Intake Screen.	X			
Clean Radiator Cooling Fins.	X			
Check and top-off Battery.				X
HYDRAULIC SYSTEM.				
Check for Oil Leaks.	X			
Top-off Oil Level.				X
Change Hydraulic Oil.	After the first 500 hours of operation, then every 2000 hours, or annually. (After winter storage).			
Main In-Tank Filter.	See page 4-03 for service information.			
Tractor Hydraulics In-Line Filter .	See page 4-03 for service information			
WARNING To avoid harm to personnel and equipment, the Robo Arm Slewing Ring attaching bolts **must be checked for tightness every 500 hours, or every six months. Torque to 80 ft/lbs.**				
MACHINE				
Check all Fasteners and Fittings.		X		X
Check and oil, Chains and Sprockets.	X			
Check: Front Tires Pressure. 30 psi. Right Rear. 34 psi. Left Rear. 18 psi.	X	The left rear and both front tires are liquid filled. A special gauge is required to check the pressure in liquid filled tires. If in doubt, contact your Dealer or Kesmac Engineering.		
Check/Sharpen/Replace-Cutter Blades.	X			
Check/Adjust /Replace-Cutter Drive Belt.	X			
Check Main and Index Conveyor Belts.	X			
Check Conveyor Slides.	X			
Check Lug Nut Torque: Rear – 355 lbs/ft. Front – 355 lbs/ft.	X	X		
STORAGE: Maintain Tire Pressures. Remove Battery and Maintain Charge. Grease Hydraulic Cylinder Rods.				

MAINTENANCE

Hydraulic System.

The Hydraulic System is filled at the factory with a premium performance, long life, anti–wear hydraulic fluid, **PETRO-CAN HYDREX XV - All Season Hydraulic Oil**.

IMPORTANT

Use only a recommended oil. Failure to do so will result in damage to the hydraulic system

The Performance Data Chart shows the typical characteristics of **HYDREX XV.**

If **HYDREX XV** is not available contact your local oil dealer, for an oil that has the same characteristics,

The Hydraulic Pumps, Main '**A1**', & Auxiliary '**A2**', are driven from the tractor crankshaft.
The Main Pump supplies oil to the 4 & 5 Bank Control Valves. See Hydraulic Schematics pages 4-06/4-07.

The Auxiliary Pump sends oil to the 7-Bank Control valves for the Robo Control Arm. See Hydraulic Schematics pages 4-06/07.

Internal tractor hydraulics operate the Cutter Motor. An In-line Filter is fitted in the tractor power beyond return line. See page 4-03

The Hydraulic Oil Tank '**B**', contains hydraulic oil for the external hydraulics. The Main Filter '**C**' mounts into the tank. See page 4-03 for filter replacement.

.

The Oil Cooler '**D**', has a built in fan that switches on automatically when the oil reaches a set temperature, measured by a sending unit in the oil tank. The oil temperature is shown on the Control Panel Screen.

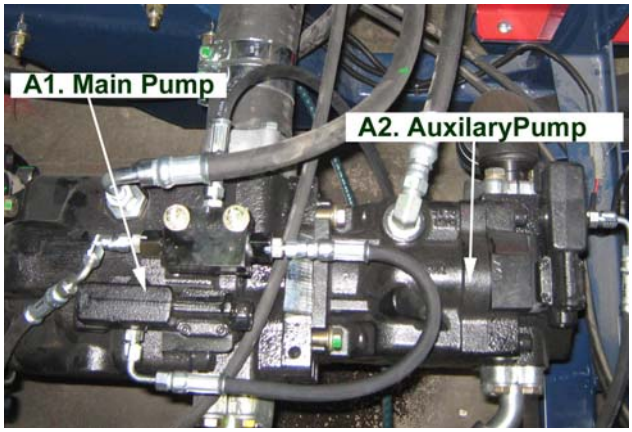
NOTE

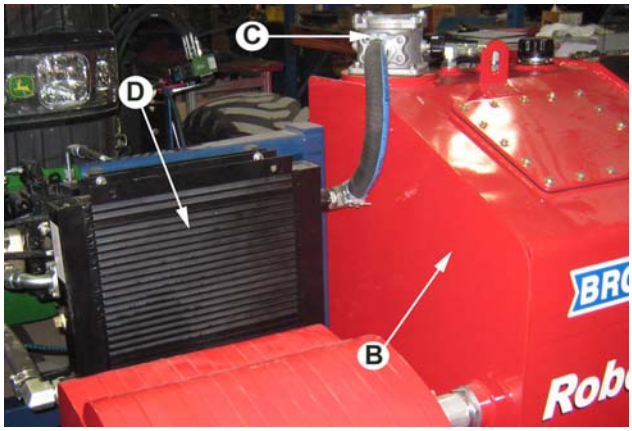
Where hoses connect, at the bulkhead on the Robo Arm, they are color coded to aid in hose routing.

IMPORTANT

To prevent serious damage to the Hydraulic System do not allow water, dirt, debris or contaminants to enter the System. Pay particular attention when working on the hydraulic tank
When working on/repairing hydraulic components thoroughly clean around the area to be worked on. Cap and plug all broken connections.

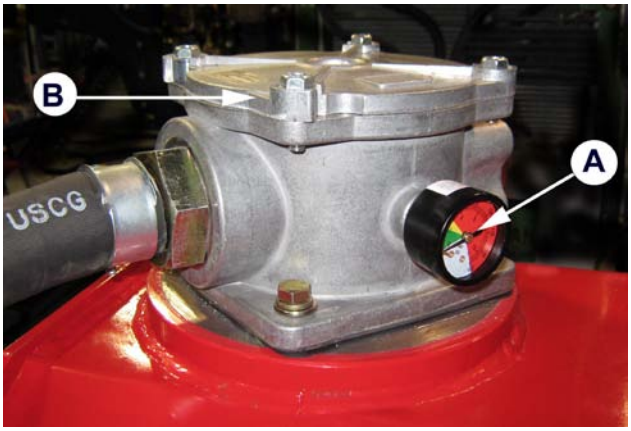
HYDREX XV. Performance Data.	
Viscosity cSt @ 40deg. C	43.2
cSt @ 100deg.C	10.5
SUS@ 100deg. F	215
SUS @ 210deg. F	61
cP@ -40deg.C.(-40deg.F).	9250
Viscosity Index.	245
Flash Point. Deg.C/Deg.F	245/473
Pour Point. Deg.C/Deg.F	-48/-54
Oxidation Stability, hours to 2.0 TAN.	10,000 +
Min. Start-up Temp. Deg.C/Deg.F	-40/-40
Operating Range. Deg.C	-18 to 79
Deg.F	0 to 174





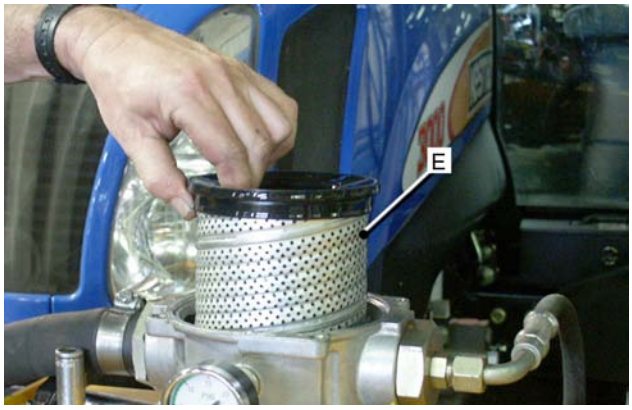
Hydraulic System.

Main In–Tank Return Filter.



It is recommended that the In-Tank Filter Element is changed **every 750 hours, or if the indicator needle on the Filter Condition Gauge 'A', enters the 'RED' zone, the filter MUST be replaced.**

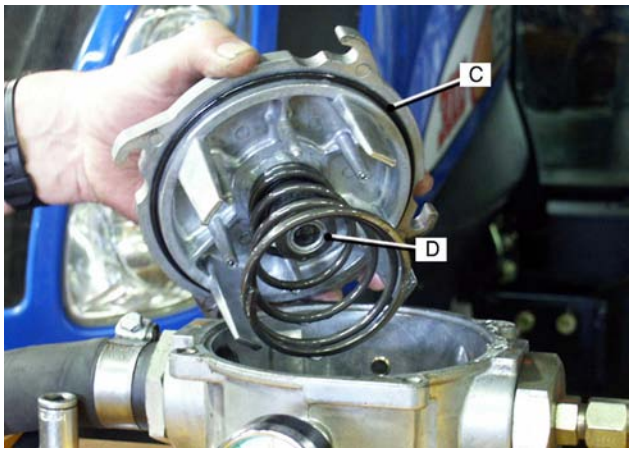
- Before loosening the bolts in the Top Plate '**B**', open the Filler Cap to relieve tank pressure.
- Press **'DOWN'** on the Top Plate, against spring pressure, at the same time turn it 'counter clockwise' to remove it.
- It is recommended that a new Top Plate O-Ring '**C**' is fitted. Lubricate it before fitting.
- Clean the Magnet '**D**' of any metallic residue.
- Remove the used Cartridge '**E**' from the tank. Install a new Cartridge. Check that the O-Ring is correctly seated in the Top Plate and all surfaces are clean.
- Refit the Top Plate by pressing '**DOWN**' and turning 'clockwise' to locate it against the bolts and tighten the bolts.



IMPORTANT

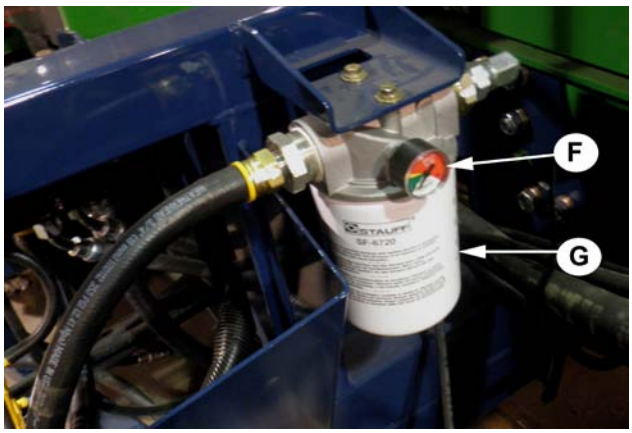
When the Filter or Filler Cap are removed during service, cover the tank openings to prevent any dirt, debris or other contaminants from entering the tank.

When changing the Hydraulic Oil (every 750 hours or annually, when the Main Filter is changed).



- Always drain the oil into an approved container.
- Clean and replace the 'magnetic' drain plug.
- Refill the tank using only an approved hydraulic oil as shown on page 4-02.
- Fill to the correct level as indicated on the Sight Glass on the oil tank. **Do not overfill.**

Return Line Filter. Tractor Hydraulics.



The Return In-Line Filter is in the line from the Cutter Head Control Valve to the tractor hydraulics power-beyond return port.
It is located to the rear of the left front wheel.
The filter has a condition indicator gauge '**F**' on the filter head.
When the gauge needle enters and remains in the '**RED**' zone, the filter must be serviced as soon as possible.

The service instructions are located on the filter body '**G**'.

MAINTENANCE

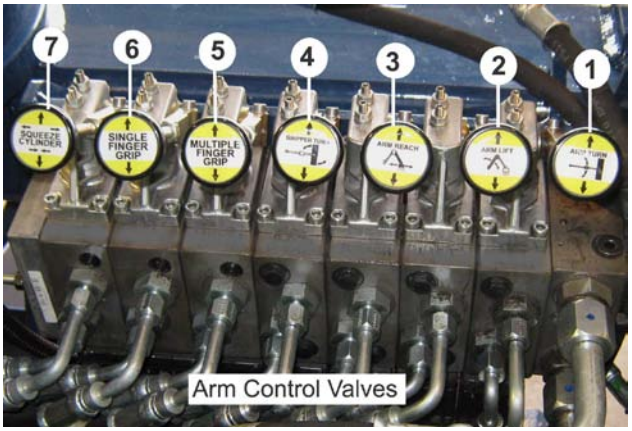
Hydraulic System.

PVG. Control Valves.

The Control Valves are located to the rear of the cab window. They can be manually operated with the window open.

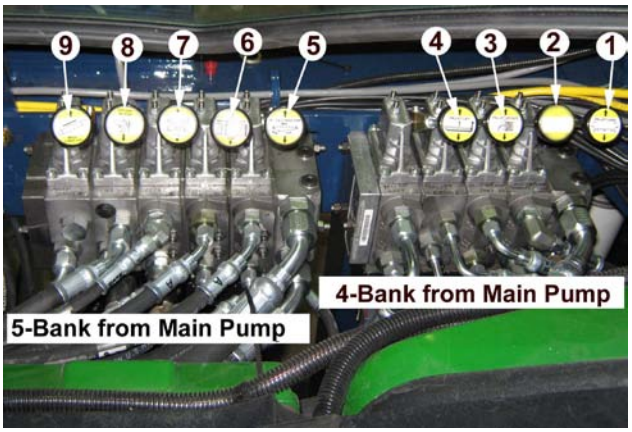
IMPORTANT

Control Handles on the Control Valves are to be used **only when doing service work,** to enable functions to **be checked.** ***DO NOT use for harvesting operations.***



The Seven Bank Valves control the following functions:

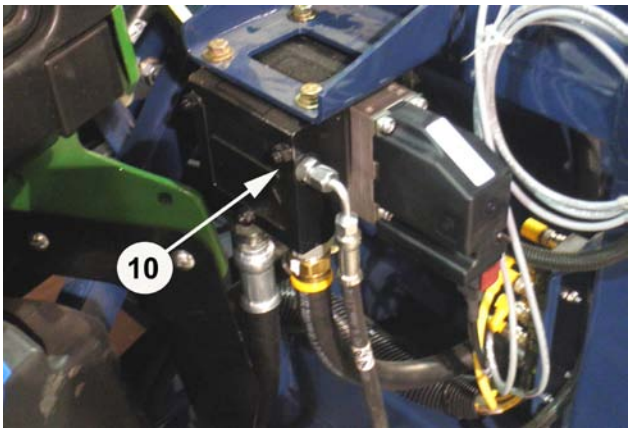
1. Arm Rotate Cylinder.
2. Arm Lift Cylinder.
3. Arm Reach Cylinder.
4. Gripper Rotate Cylinder.
5. Multi Finger Grip Cylinder.
6. Single Grip Finger Grip Cylinder.
7. Squeeze Cylinders.



The 4 & 5 Bank Valves control:

1. Pallet Load.
2. Pallet Drop.
3. Pallet Rotate.
4. Forks 'UP-DOWN'.

5. Index Conveyor
6. Eject Cylinder.
7. Gate.
8. Cut – Off Motor
9. Conveyor – 'ON'.



Single Control Valve.

10. Cutter Control Valve – No Control Handle
    Located on the right hand side of the frame.

The following functions are powered from the Tractor Hydraulic System.
(See Hydraulic System Diagram).

- Port '**A**' Conveyor 'DOWN'.
- Port '**B**'. Conveyor 'UP'.

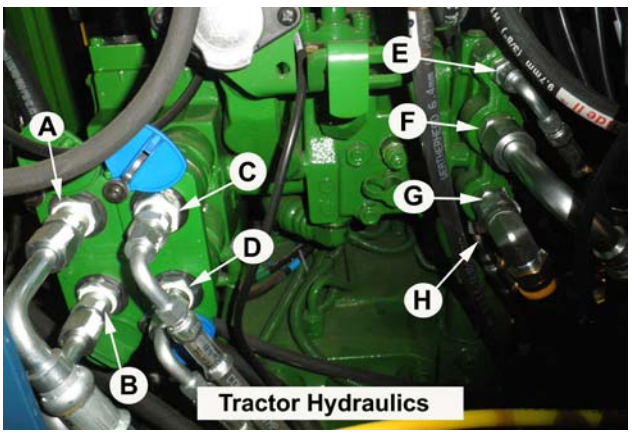
- Port '**C**' Retract Depth Cylinder. (Increase thickness).
- Port '**D**' Extend Depth Cylinder. (Decrease thickness).

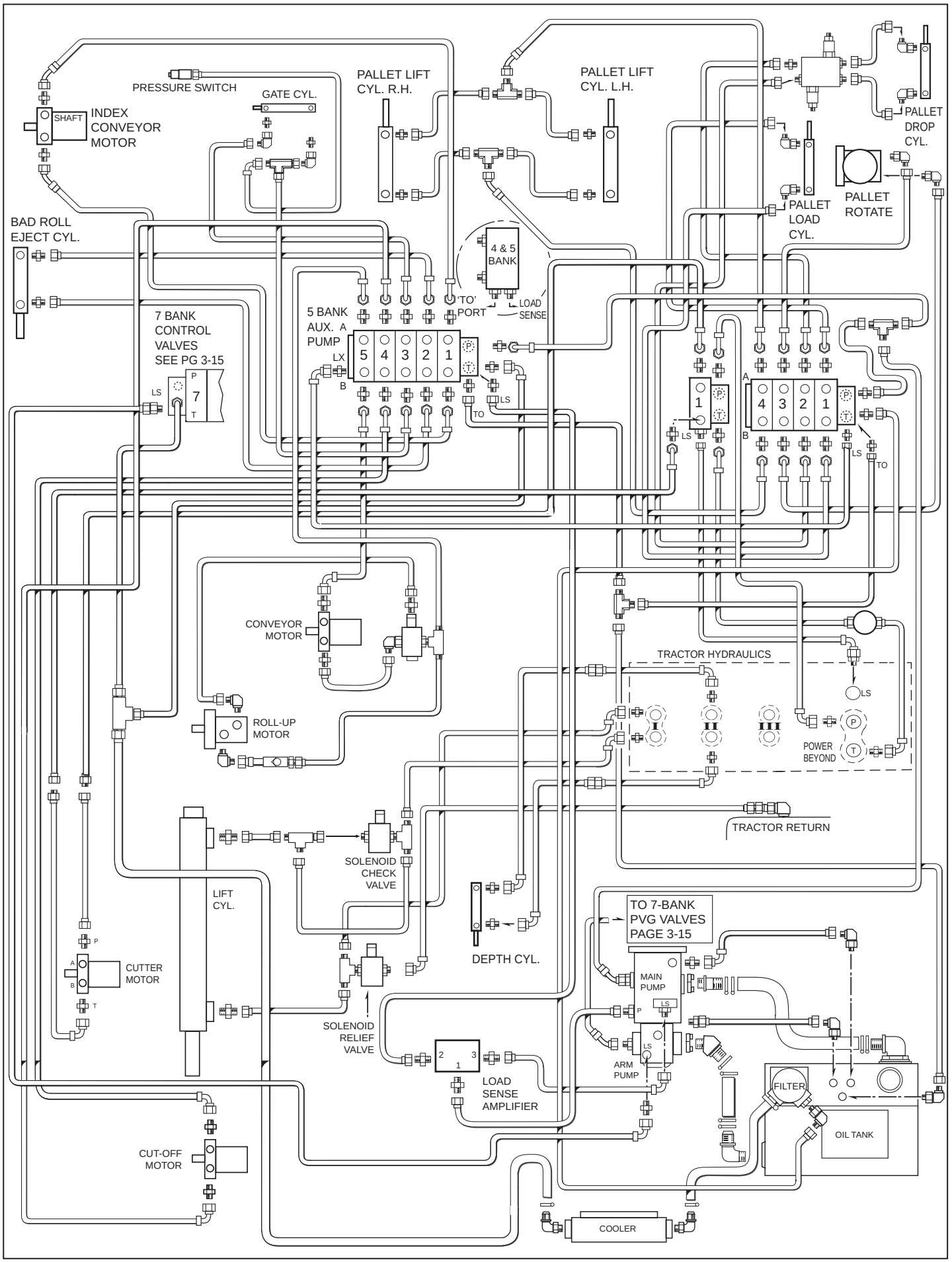
- Port '**E**'. Load Sense to Cutter Control Valve.

- Port '**F**'. Pressure to Cutter Control Valve.

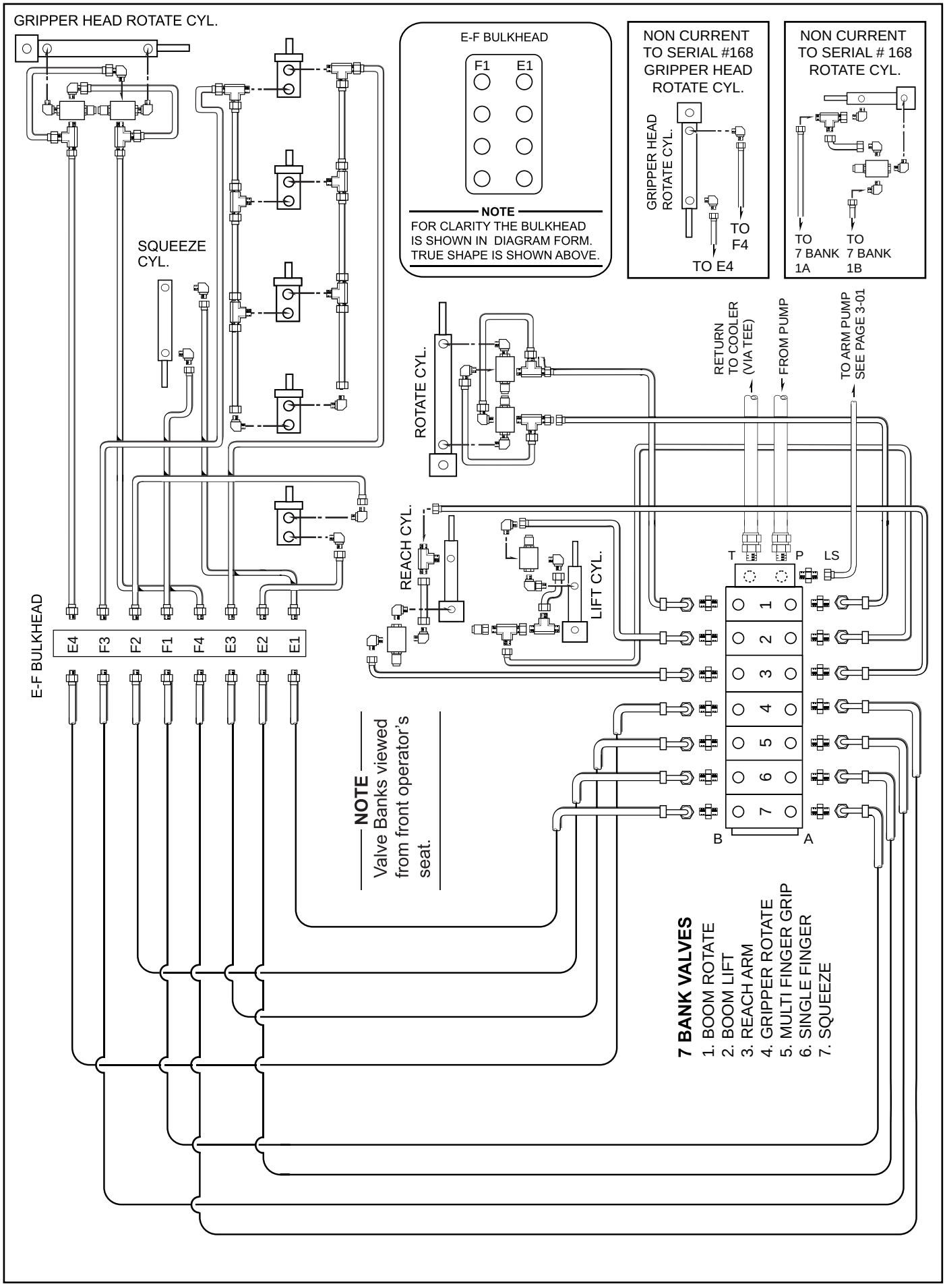
- Port '**G**'. Return from Cutter Control Valve.

- Port '**H**'. Return from Lift Cylinder Solenoid Relief Valve.



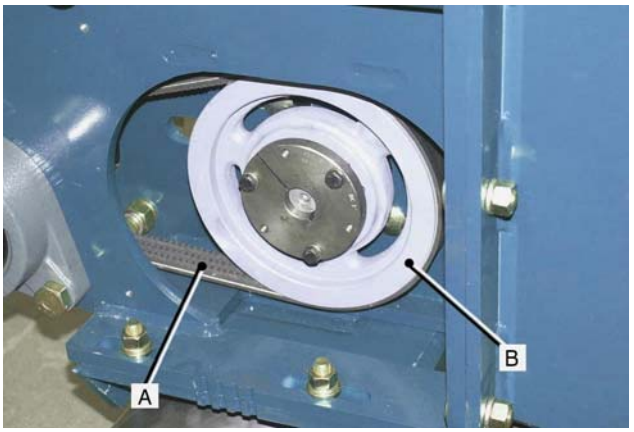


HYDRAULIC SCHEMATIC. ROBOMAX JD. Serial No. 179 and up. 4-05


GRIPPER HEAD ROTATE CYL.
E-F BULKHEAD
F1
E1
NOTE
FOR CLARITY THE BULKHEAD IS SHOWN IN DIAGRAM FORM. TRUE SHAPE IS SHOWN ABOVE.
NON CURRENT TO SERIAL #168 GRIPPER HEAD ROTATE CYL.
GRIPPER HEAD ROTATE CYL.
TO F4
TO E4
NON CURRENT TO SERIAL # 168 ROTATE CYL.
TO 7 BANK 1A
TO 7 BANK 1B
SQUEEZE CYL.
ROTATE CYL.
RETURN TO COOLER (VIA TEE)
FROM PUMP
TO ARM PUMP SEE PAGE 3-01
REACH CYL.
LIFT CYL.
T
P
LS
E-F BULKHEAD
E4
F3
F2
F1
F4
E3
E2
E1
1
2
3
4
5
6
7
B
A
NOTE
Valve Banks viewed from front operator's seat.
7 BANK VALVES
1. BOOM ROTATE
2. BOOM LIFT
3. REACH ARM
4. GRIPPER ROTATE
5. MULTI FINGER GRIP
6. SINGLE FINGER
7. SQUEEZE

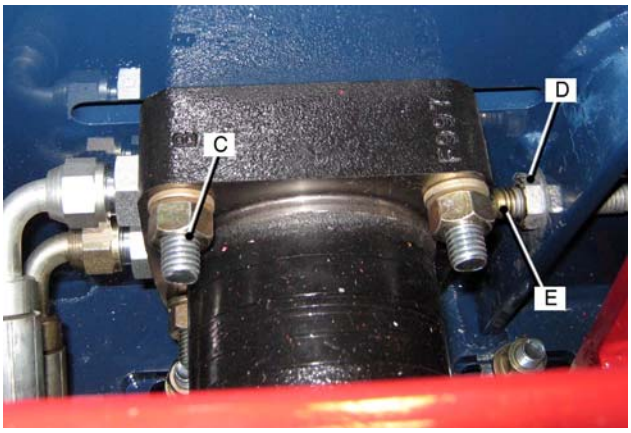
Cutter Drive Belt Adjustment.

When correctly adjusted there should be **½ inch deflection**, at a point midway between the drive and driven sheaves. **Do not over tighten the belt** as this will result in premature belt failure and possible damage to the Motor and Eccentric Shaft Bearings.



To adjust the Drive Belt tension:

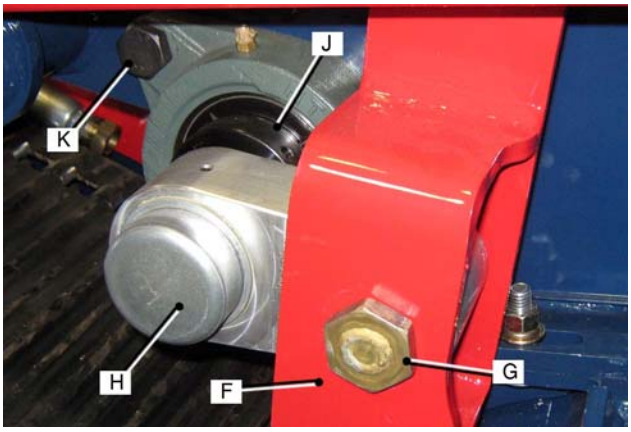
- Remove the Side Cover to access the Belt '**A**', and the Motor Sheave '**B'**.
- Loosen the Motor Mounting Bolts '**C**', and back-off the Adjusting Bolt Locknut '**D**'.
- Turning Adjusting Bolt '**E**' '**OUT**' pushes the Motor forward and tightens the Drive Belt, turning it '**IN**', away from the motor, slackens the belt.
- Tighten all fasteners when adjustment is complete.
- Replace the Side Cover.



Cutter Drive Belt Remove/Replace.

- Proceed as shown above, but turn the Adjusting Bolt '**fully inward**', (away from the motor).
- Push the Drive Motor '**back**', as far as possible, and remove the Belt from the Drive Motor Sheave.
- Remove the fasteners that attach the Side Arm '**F**' to the Cutter Blade.
- Remove the Tie Bolt '**G**', and push the Side Arm '**forward**', to allow the Connecting Rod '**H**' to swing down.
- Release the Bearing Lock Collar '**J**', and remove the two Bolts '**K**' from the Bearing.
- Slide the Bearing 'out', towards the Connecting Rod. The self centering bearings will allow the Eccentric Shaft to swing down, sufficient to allow the Drive Belt to be removed from the Cutter Head.

Reverse the procedure to install a new Drive Belt. Adjust the belt tension as shown above.



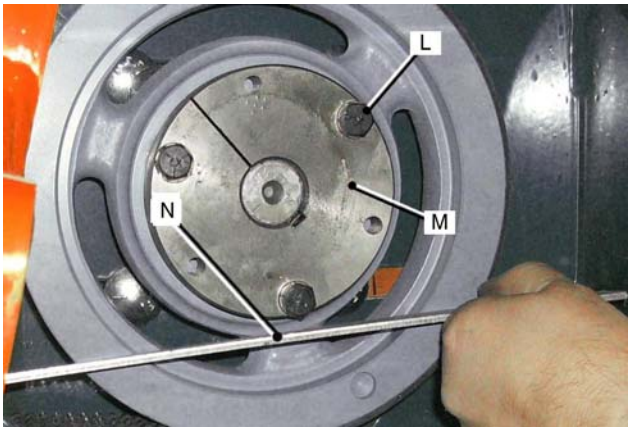
IMPORTANT

The Bolts attaching the Eccentric Shaft Bearings to the Cutter Head Frame must be tightened to 300 ft.lbs.

Removing the Cutter Drive Motor :

- Slacken the Drive Belt as shown above.
- Remove the hydraulic fittings from the Motor, note to which 'port' the hoses connect.
- Remove the three bolts '**L**' from the Taper Bushing.
- Fit the Bolts into the threaded holes '**M**', and tighten them 'evenly' to release the Bushing.
- Remove the Sheave from the Motor Shaft
- Remove the Motor Mounting Bolts and lift the Motor from the frame.

Reverse the procedure to install a new Drive Motor. Adjust the belt tension as shown above.



IMPORTANT

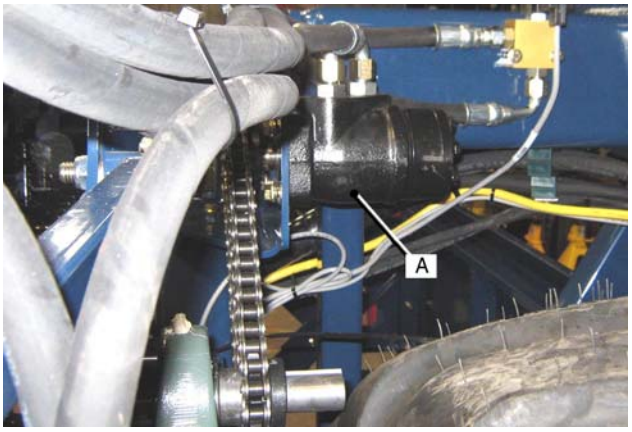
The Motor Sheave must be aligned with the Eccentric Shaft Sheave with a Straight Edge 'N', positioned across the face of the Sheaves as shown

MAINTENANCE

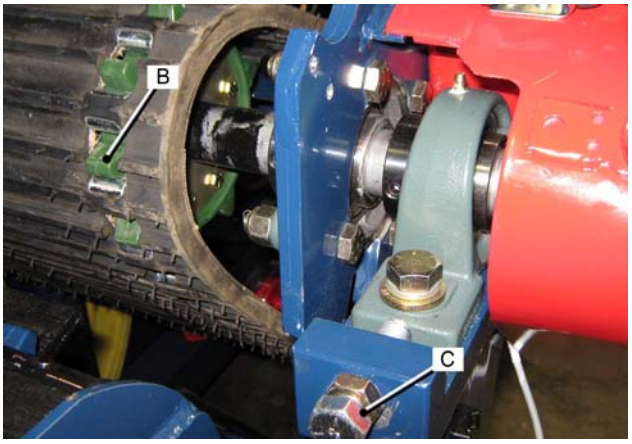
Adjustments.

Main Conveyor Mat
The Rubber Conveyor Mat has proven to work well in a variety of conditions. It is the preferred choice of most Sod Growers. See page 4-09 for the installation of a new Mat and Metal Clip replacement.

Conveyor Mat Drive
Hydraulic Motor '**A**' drives Sprockets '**B**' that run in 'slots' in the mat.
The 'slots' are fitted with replaceable Metal Clips.
See following pages for Mat and Clip replacement.
To prevent premature/excessive wear, the Sprocket Teeth **must be 'centered'** in the 'slots'.
The Bearing Adjustment Bolts '**C**', are set at the factory and should only require adjustment if the 'tracking' of the Conveyor, relative to the tractor, is adjusted.

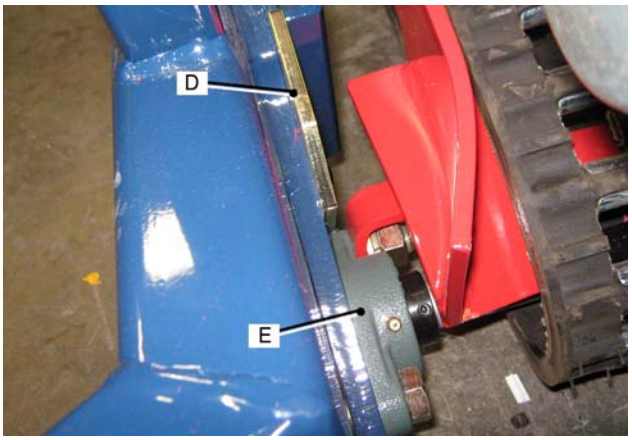


Crown Roller
A Crown Roller, at the front of the Conveyor, keeps the Mat 'tracking' square to the conveyor frame.
The Roller is aligned in the frame with adjustable Tapered Wedges '**D**' located at each Roller Shaft Bearing '**E**'.
See following pages for alignment procedure.



IMPORTANT

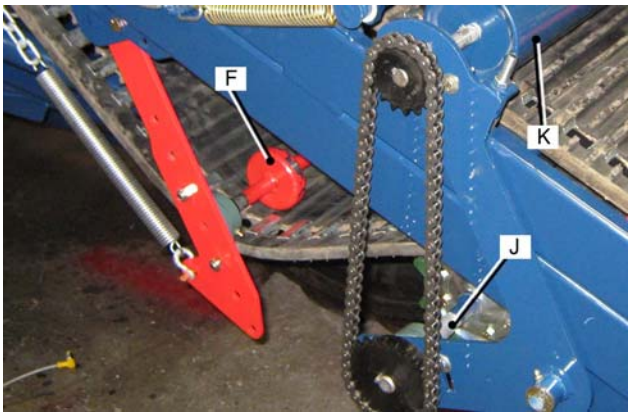
The Crown Roller must be set so that the Sod Guide Bracket does not 'foul' against the Conveyor Mat.
Initially set the Crown Roller at the mid-point of adjustment, determined by the back stroke of the Cutter Blade, and with allowance for the thickness of the Conveyor Mat. Also allow for some forward movement of the assembly during final alignment.



Mat Tension Idler.
Tension on the Conveyor Mat is maintained by adjustable Tensioned Idlers '**F**'.
Tension Springs on the Idler Arms are attached to chains.
Move the Springs in the chain links to adjust the tension.

IMPORTANT

Do not allow the Idler Arm to approach an angle of 90 degrees relative to the Conveyor Frame.
If this occurs the Idler Arm will be pulled 'over center' and tension in the Conveyor Mat will be lost.



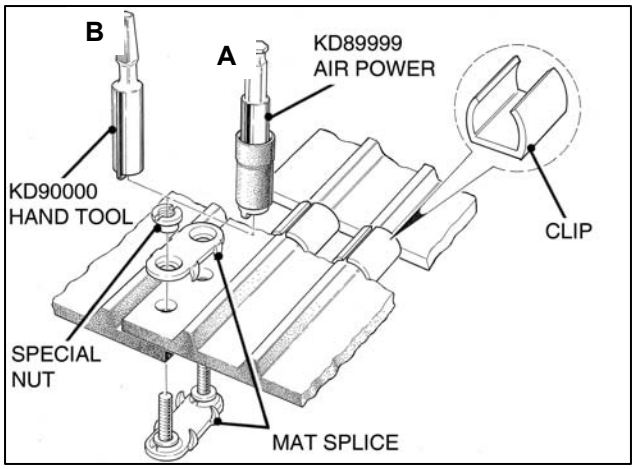
Mat Support. 4 inch Roller Drive.
The Mid-Idler Shaft and Sprockets Assembly '**J**', supports the Conveyor Mat below the Conveyor Frame.
Sprockets on the Idler Shaft drive the 4 inch Feed Roller '**K**'.

CONVEYOR MATS.

Rubber Conveyor Mat.

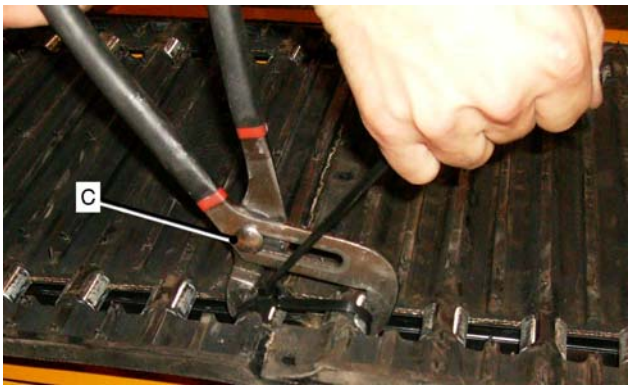
Mat Splices.
The Conveyor Mat is joined with Metal Splices. The Mat must be joined with the lower part of the Mat over-lapping the upper part. It is important that any excess portion of the Threaded Stud is broken off above the Nut when the Splice has been installed. Special Tools are available for easy removal and installation of the Mat Splices.

Type '**A**' is for use with Air Power.
Type '**B'** is for use with a hand tool.



Mat Splice – Installation.

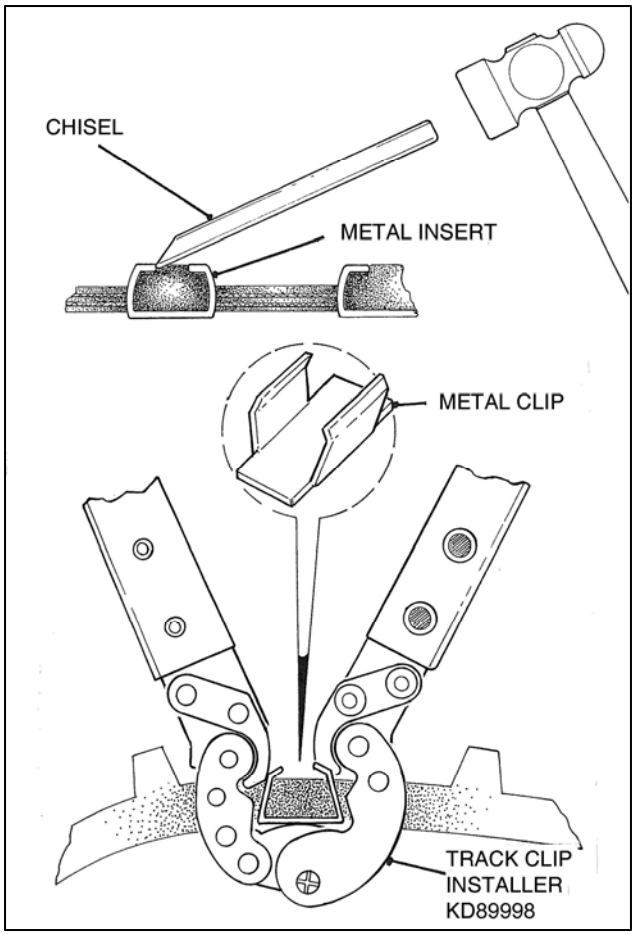
When installing the new mat, use Expanding Grips '**C**' to pull the mat ends together, while securing them with Zip Ties or wire, until the Mat Splices have been fitted.



Mat Clips.
The Metal Mat Clips will wear and need replacing. Use a chisel or similar tool to open them up for removal. A Special Tool (Part No. KD89998) is available to make installation fast and safe.

WARNING

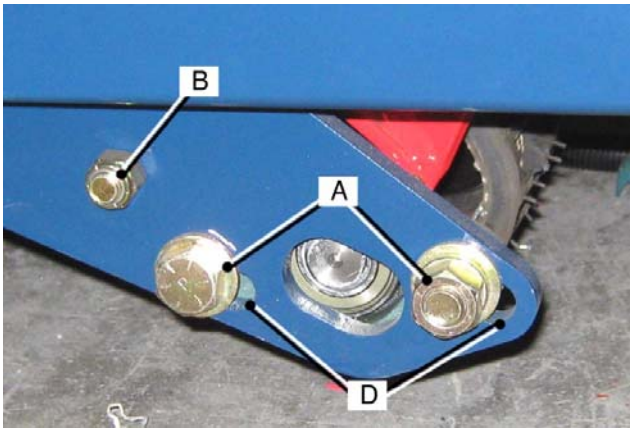
Do not operate the Conveyor until the Stud Ends have been broken off.
Failure to observe this precaution may result in serious injury to the operator, and/or damage to the machine.



Mat Clip –Remove/Fit

Conveyor Mat Installation.

After installing the Conveyor Mat it must be aligned to run 'parallel' in the frame by adjusting the Crown Roller.

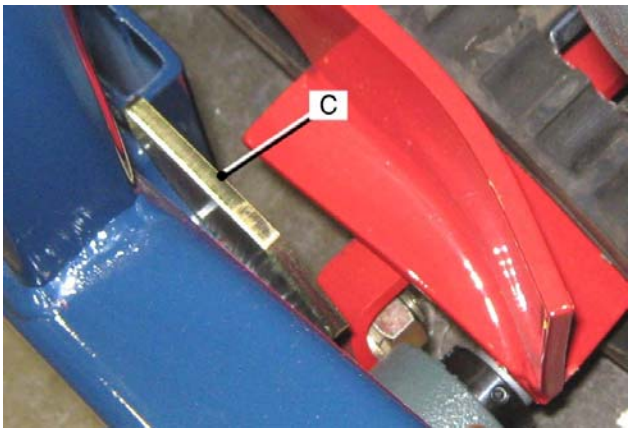


Crown Roller Alignment.

CAUTION

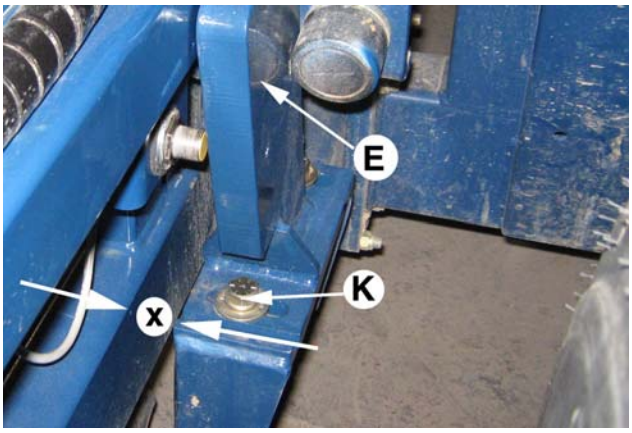
Adjustments **must be done by two people.** One to operate the controls, the second one to make adjustments.

- Loosen the Bearing Bolts '**A**' and the Adjusting Wedges Bolts '**B**'. Tap the Wedges '**C**', '**down**' to position the Crown Roller Shaft in the center of the Adjusting Slots '**D**'. (on both sides of the frame). To allow for final adjustment do not fully tighten the fasteners.
- Run the Conveyor at **LOW SPEED.**
- Observe if the mat tracks to the '**left**' (inner side of the frame), tap the '**right side'** Adjusting Wedge '**down**'.
- If the mat tracks '**right**' (to outer side of the frame), tap the '**left side'** Adjusting Wedge '**down**'.
- Adjust the Wedges '**C**', until the Mat runs parallel to the frame.
- Stop the Conveyor.
- Set the Roller Scraper 1/32 in. from the Crown Roller.
- Tighten all fasteners.



Main Conveyor Tracking.

The Conveyor is kept 'parallel' to the tractor, by two Cam Followers on the Conveyor Frame running against the Adjusting Bracket '**E**' on the Side Beam, and also the Conveyor Support Bearings '**F**', at the top of the Conveyor. Check that the Conveyor is 'parallel' to the tractor by measuring, **in two places**, the gap '**X**', between the Side Frame of the Conveyor and the Side Beam on the tractor.
The 'tracking' is set-up at the factory and should not need adjusting, except if the Conveyor is removed for service, (or in case of collision).

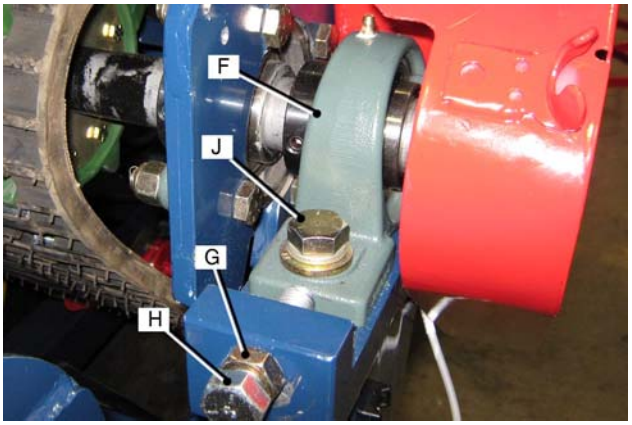


To set the Conveyor 'parallel' to the tractor :

WARNING

To avoid possible serious injury, when the Cutter Head is raised for service, **the Safety Lock must be secured** to prevent accidental lowering of the Cutter Head.

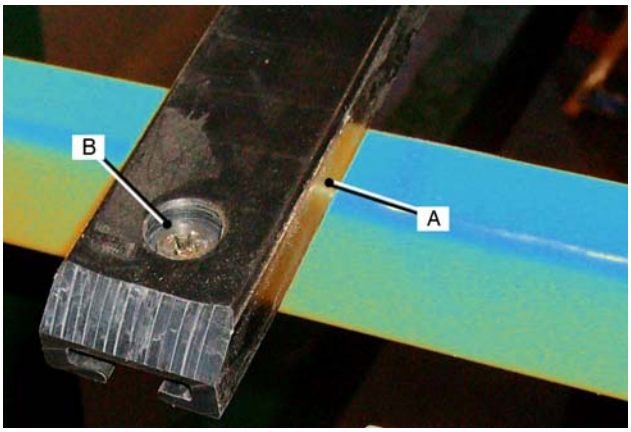
- Raise the Conveyor sufficient for the Ground Roller to clear the ground.
- Loosen Locknut '**G**'. 'Back-off' Adjuster Bolts '**H**'. Loosen the Support Bearings Bolts '**J**'. (RH. shown).
- Loosen the Adjuster Bracket Bolts '**K**', and slide the Bracket '**E**', 'in or out' until the gap '**X**', is equal in **two places**. Tighten the Bolts '**K**'.
- Tighten the Support Bearing Bolts '**J**'.
- Screw the Bolts '**F**' inward, tight against the Bearing, and tighten the Locknuts '**G**'.



Conveyor Mat Sliders.

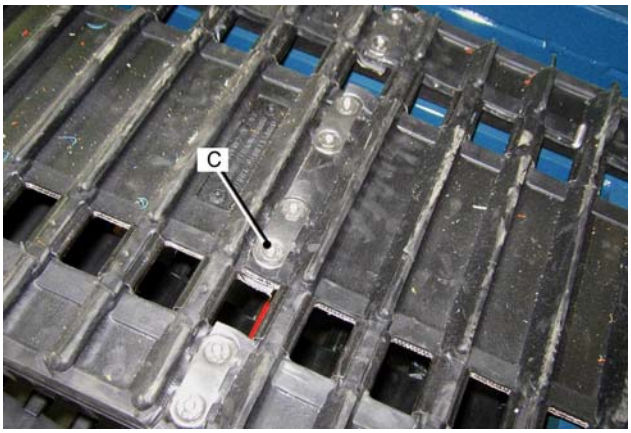
The service life of the Conveyor Sliders will vary, depending on the soil conditions.
Inspect them for excessive wear, particularly under the Roll-up Tray, when replacing the Mat, and at major service.

The Sliders '**A,**' fit onto 'T-Section' Rails and fastened at the lower end with Flat Head S.S. Screws '**B**' and Locknuts.
Excessive wear will be evident when the rails show through the Sliders.
Wear thickness, (**3/8 inch**), is less than the overall thickness.

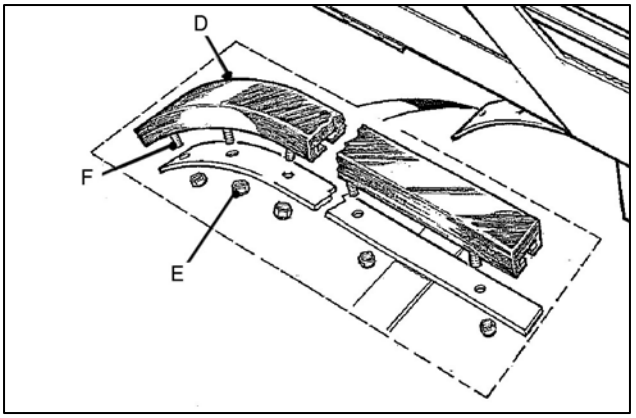


Remove/Replace Upper Slides.

- Locate a join in the Mat and position it at the mid-point of the Conveyor Frame.
- Remove the Idler Tension Springs,see page 4-08.
- Remove the Mat Splices '**C**', see page 4-09.
- Pull the Mat clear of the top Drive Sprockets and off the bottom front Crown Roller.
- Remove the Screws and Locknuts fastening the Sliders to the frame rails, and pull the Sliders up and off the Rails. It may be easier and quicker to cut badly worn Sliders off the Rails. Clean up the Rails for easier fitting of the Sliders.
- Feed the Slider onto the rail, from the top. 'Knock' it down the rail until the bottom fasteners can be fitted.



NOTE
Always replace the Sliders as a set.



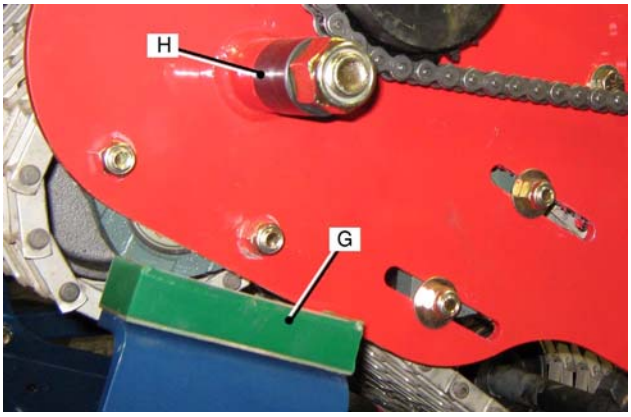
Lower Sliders.

To replace the Lower Mat Sliders '**D**' :

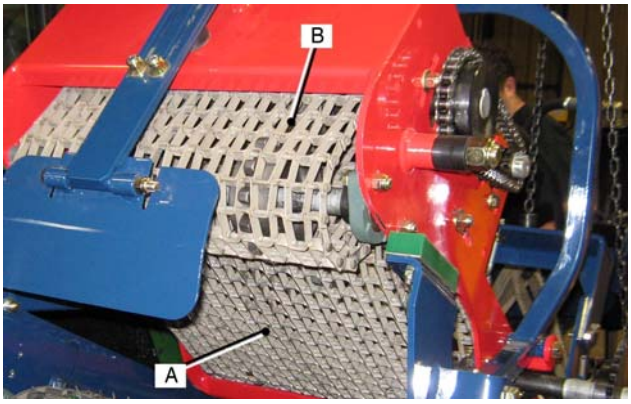
- Remove the five Locknuts '**E',** and lift the Sliders off the rails
- Remove 'T-Bolts' '**F**', from the Sliders and fit them into the new Sliders, and bolt them into place.

Roll-up Conveyor Stops.
The Roll-up Conveyor is a Mintex Metal one. See page 4-14 for details on the Mintex Mat.

- Roll-up Conveyor Stops '**G**', are attached on both sides of the Frame.
- Bushings '**H**', are attached to both sides of the Roll-up Frame.
- Replace the Conveyor Stops and Bushings if badly worn or damaged.



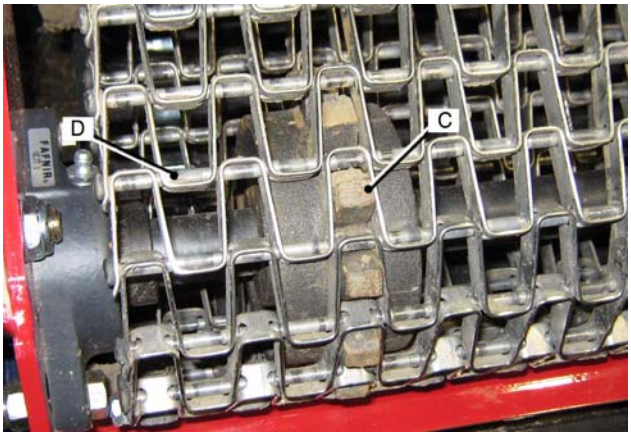
Mintex Metal Mats.
Roll-Up and Roll Eject.



Roll-Up Mat '**A**'. Roll Eject Mat '**B**'.
Replace complete Mats as there are no replacement parts. To ensure a long service life, it is important that the Mat Drive and Driven Shafts, are parallel to each other and set 'square' in the Frame.

NOTE
The links, at the outer edge of the Mat must point 'opposite' to the direction of mat travel.

Mat Drive Sprockets.

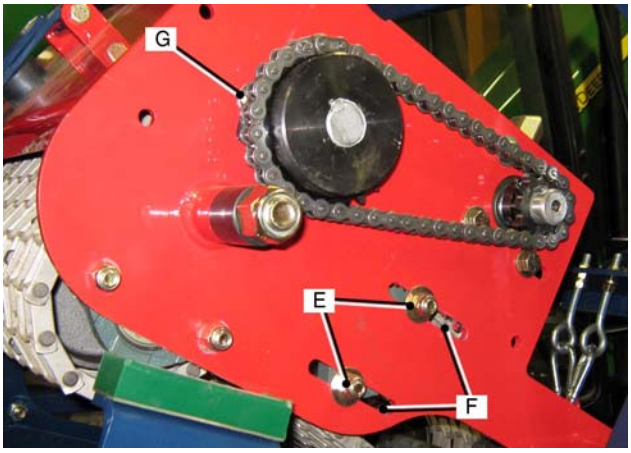


- The Sprockets are keyed to the shaft and locked with Set Screws.
- The teeth of the Drive Sprockets '**C**' **must** contact the Mat Connectors '**D**'.
- Sprocket Teeth **must be centered** in the Mat openings. If the Teeth contact the side face of the Links it will result in excessive and premature wear to the Sprockets and the Mat, and early failure of the Mat.

Idler Sprockets.

The Idler Sprockets also are keyed and locked with Set Screws. They are positioned one inch closer to the Center of the Mat than the Drive Sprockets.

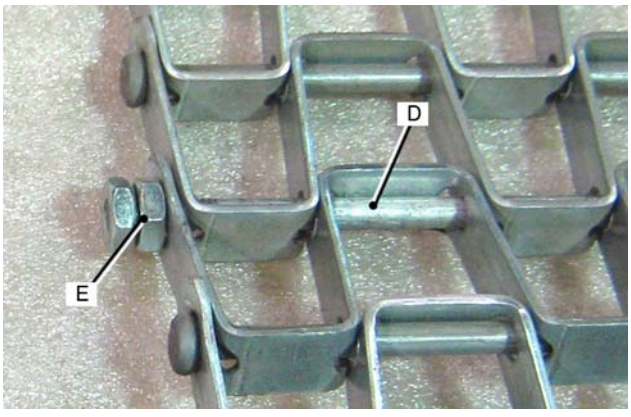
NOTE
If the Sprocket Teeth show excessive wear, it is recommended that the Roll-Up Frame Assembly be removed for complete overhaul.



To replace the Roll-Up Mintex Mat :

- Loosen the Bearing Bolts '**E**', to slacken the Mat.
- Locate the Removable Mat Connector '**D**', remove the two Jam Nuts '**E,**' pull the Connector out of the Mat and remove the Mat from the Frame.
  Install the new Mat in reverse order.
- Tension the Mat by pushing the Bearings back in the Slots '**F**', measure that the bearings are back in the slots 'equally' on both sides of the frame, to ensure that the shaft is square in the frame.

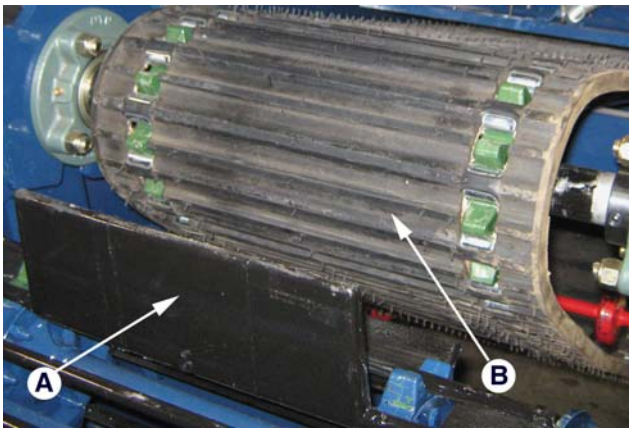
IMPORTANT
To prevent premature and excessive wear **do not over tension the Mat.** It should be just 'snug tight'.



Follow a similar procedure to replace the Roll Eject Mat :

- Loosen the **Drive Shaft** Bearing Bolts '**G**', to slacken the Mat. Remove the Mat Connector and Mat.
  Install the new Mat. Push the Drive Shaft Bearings back in the slots 'equally' on both sides, to tension the Mat, and tighten the Bearing Bolts.

Index Conveyor.

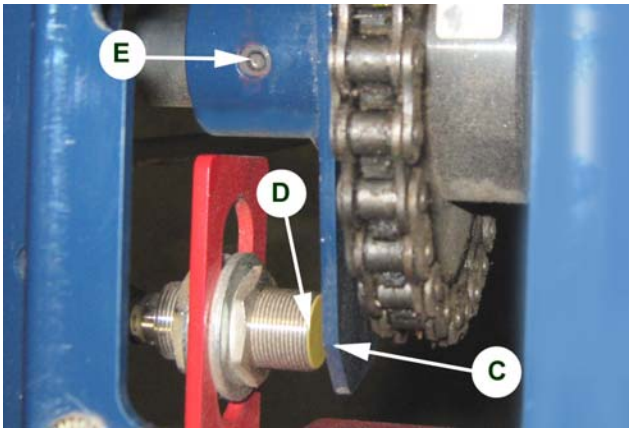


Sensor Flag Adjustment.

The correct position of the Index Conveyor Roll Cleats '**A**', relative to the Main Conveyor '**B**', ensures that the Sod Rolls drop onto the Index Conveyor '**between**' the Roll Cleats. The positioning of the Roll Cleats is adjustable 'fore and aft', by rotating the Sensor Flag '**C**', relative to the Sensor '**D**'.

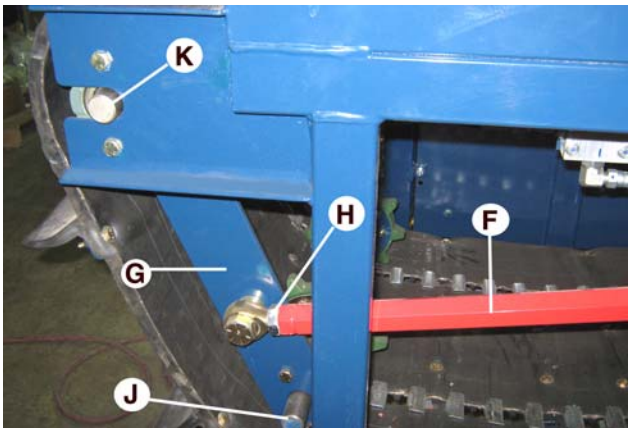
IMPORTANT

When adjusting the Sensor Flag, start with it 'centered' on the face of the Sensor, then rotate it in small increments until the correct setting is obtained.



To adjust the position of the Conveyor Cleats :

- Remove the Cover Plate over the Drive Sprocket, Sensor Flag and Sensor.
- Loosen the Set Screw '**E**', in the Sensor Flag Boss.
- Rotate the Sensor Flag '**clockwise**' to move the Cleats '**forward**'.
- Rotate the Sensor Flag '**counterclockwise**' to move the Cleats '**rearwards**'.
- Tighten the Set Screw '**E**'
- When adjustment is complete, replace the Cover.

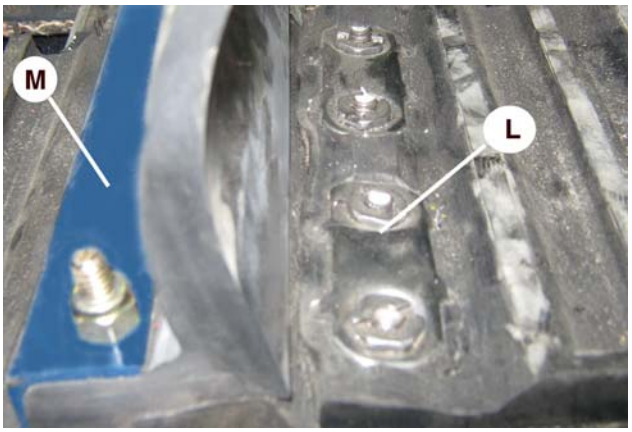


Index Conveyor. Mat Tension.

To maintain tension in the Conveyor Mat when the Index Conveyor moves from the normal operating position to the 'eject' position, the Link Arms '**F**' automatically push back against the Idler Sprocket Arms '**G**'.

To increase Mat Tension :

- Loosen Locknuts '**H**' at each end of the Link Arms '**F**'.
- Turn the Link Arms '**clockwise**' to extend them. They **must be adjusted equally** to keep the Idler Shaft parallel to the Conveyor Drive Shaft.
- Re-tighten the Locknuts.



To replace the Conveyor Mat :

- Locate the Mat Join ' connectors' '**J**'.
- See page 4-11 for Mat Connector removal and replacement. Remove the mat from the sprockets and out of the conveyor frame.
- Install the new mat in the reverse order.

Mat Cleats :

To replace worn or damaged Mat Cleats remove the Clamp Bar '**M**'.

LUBRICATION

Recommended Lubrication Schedule.

It is important that the Recommended Service Schedule is followed. Regular service and cleaning will maintain the machine in good working condition, prolong its working life and reduce repair costs.
Refer to the illustrations on following pages.

Every12 hours of operation. (Daily).

Apply light oil to the chains that drive the :

- Main Conveyor
- Roll-Up Mat.
- Roll Eject Mat.
- Pallet Lift.
- Four Inch Roller.

Do not use grease to lubricate the chains. It accumulates dirt and result in premature chain wear.

Weekly.
Apply oil to the Pallet Injector Shafts, Linkages and Pivots.

Every 80 hours of operation :

Apply grease gun, (Lithium Grease), to all bearings.

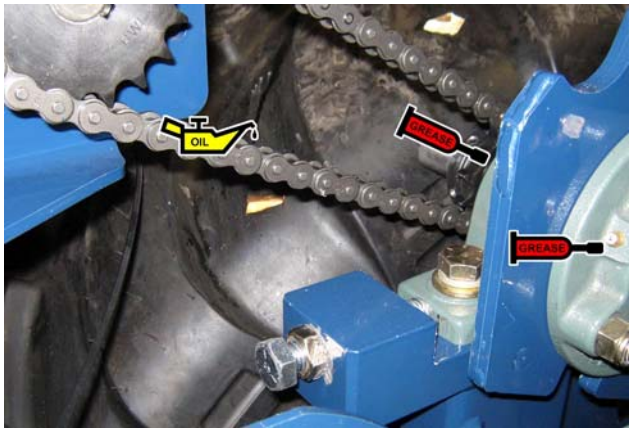
- Cut-Off Cam.
- Connecting Rod, 'small end'.(See Note).
- Cut-Off Blade Shaft.
- Ground Roller.
- Crown Roller.
- Main Conveyor Drive Shaft and Conveyor Support.
- Four Inch Roller Shaft, Sprocket Drive Shaft, and Pivot Arm.
- Mat Idler Roller Shaft and Idler Arm Pivot.
- Roll-Up Mat Drive and Idler Shafts.
- Eject Mat Drive and Idler Shafts
- Pallet Lift Rollers.
- Gripper Pivots.
- Robo Arm Lift and Reach.
- Index Conveyor – Front Idler Shaft and Rear Drive Shaft.
- Index Conveyor Mat Tension Idler Shaft.

NOTE

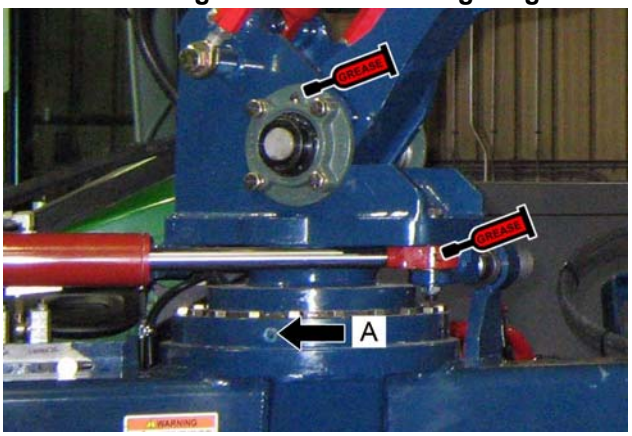
The 'large end' of the Connecting Rods, on the Eccentric Shaft, has Taper Roller Bearings. These bearings are designed to give long trouble free service.
Every twelve remove the connecting Rods and Bearings. Clean and re-assemble them packed with bearing grease.
The full service procedure is covered in the Service Manual.

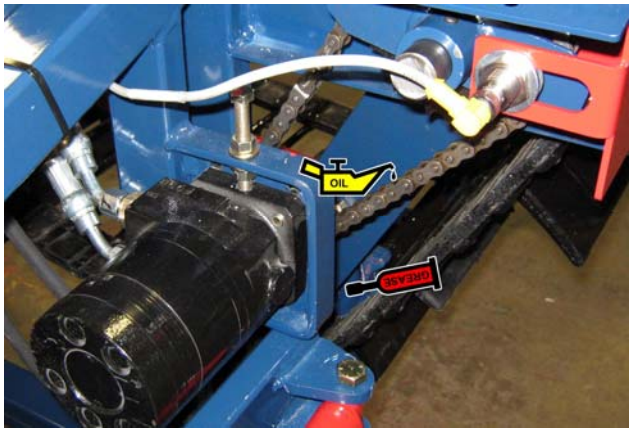
IMPORTANT

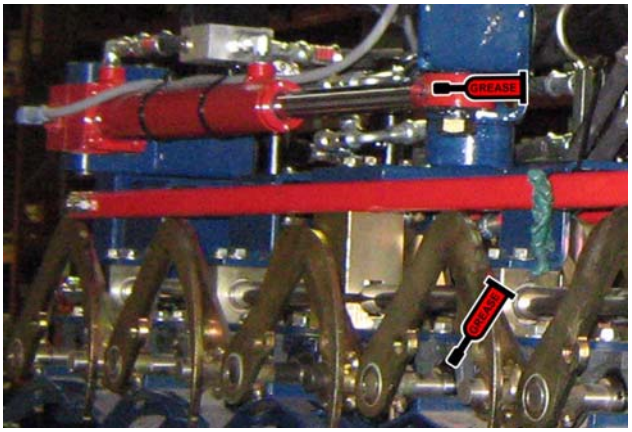
Robotic Arm Slewing Ring.
Refer to pages 17to 19 for details on lubricating procedure for the Slewing Ring.
To ensure a long operating life on the Slewing Ring it is important to adhere to the lubricating instructions. Also note the **caution** concerning pressure washing in the vicinity of the upper grease seal.

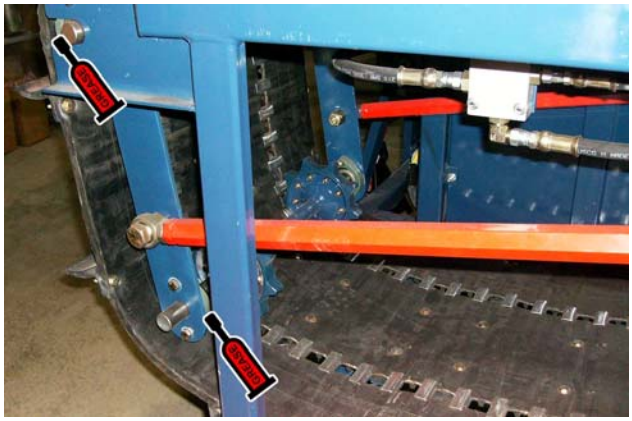


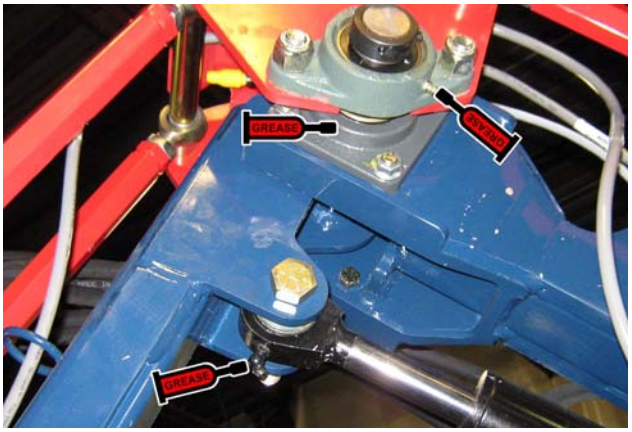
Ref. 'A'. See Page 4-17/19 for Slewing Ring details.

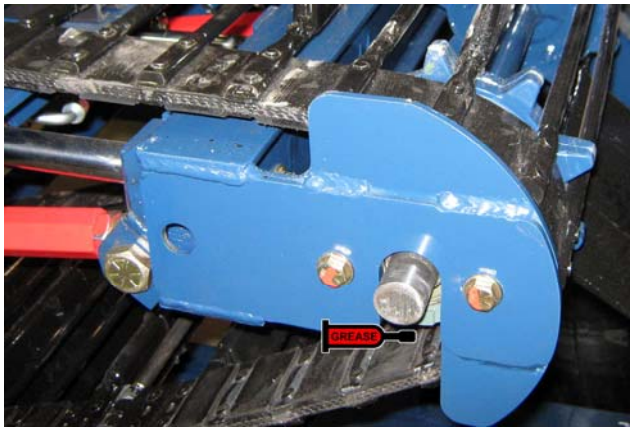


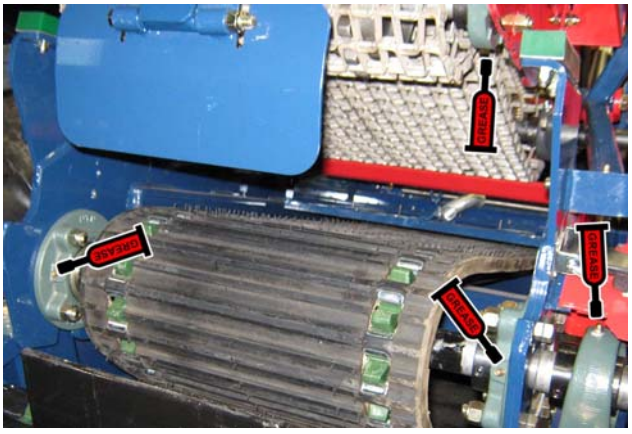


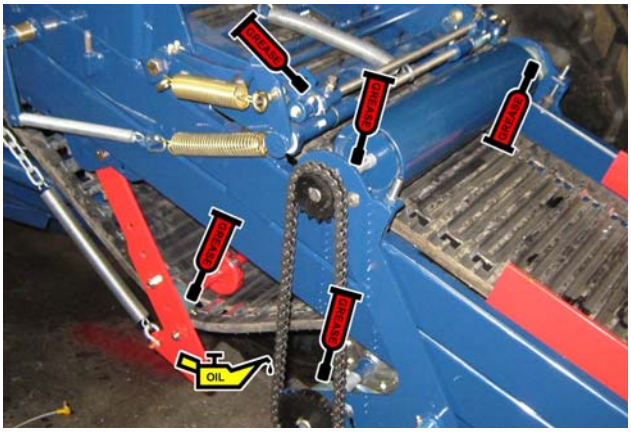








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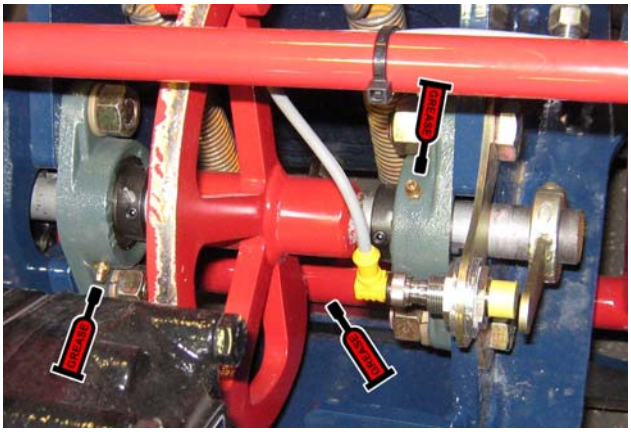
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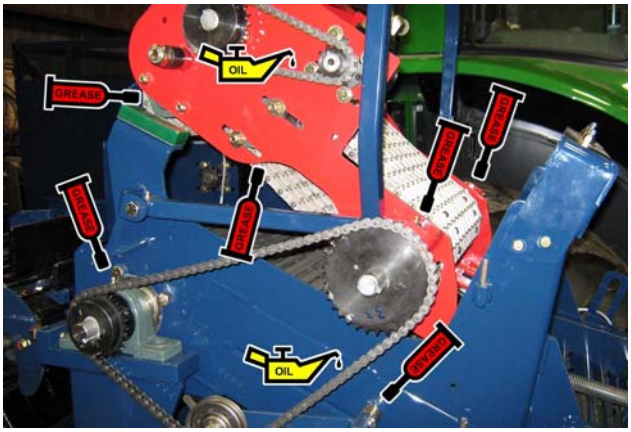
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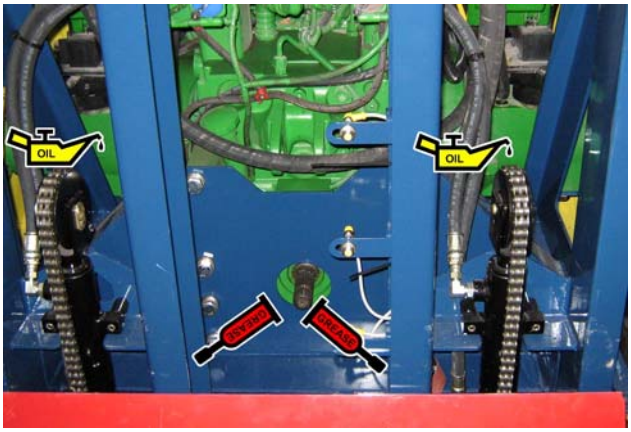
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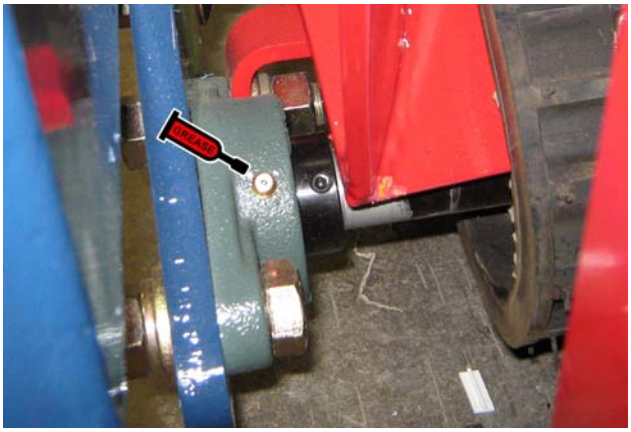
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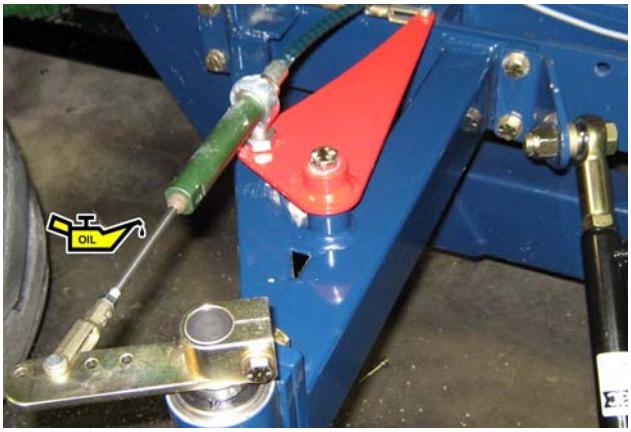
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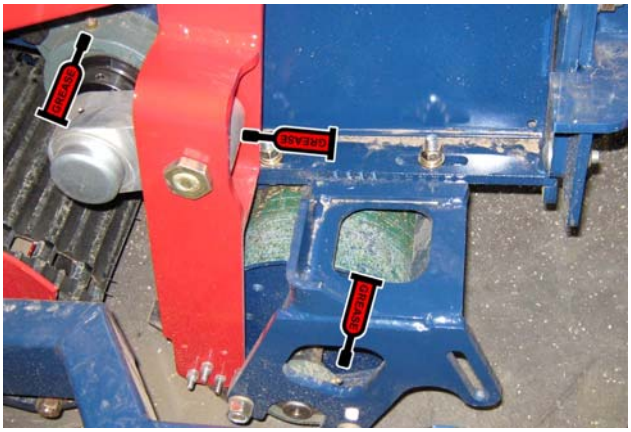
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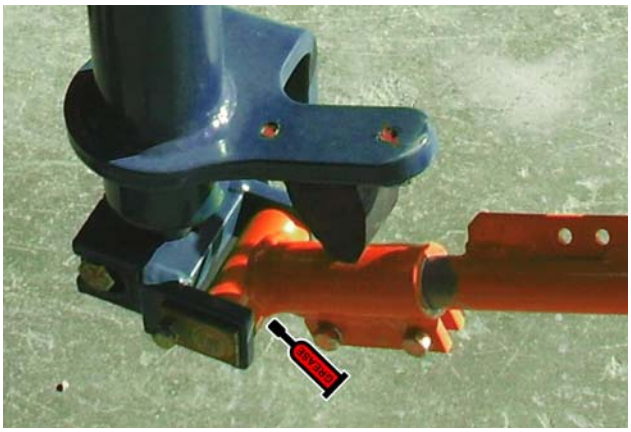
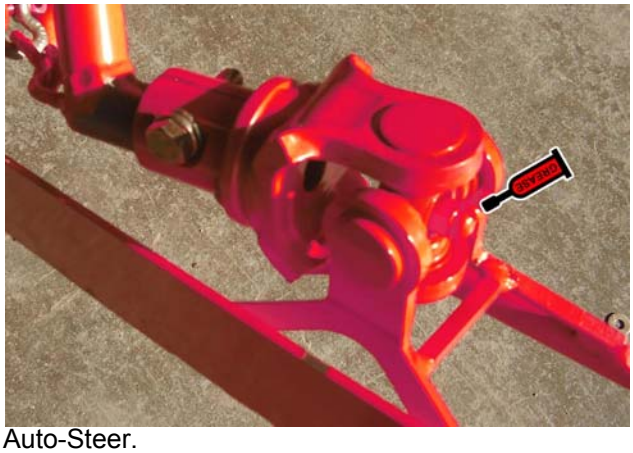
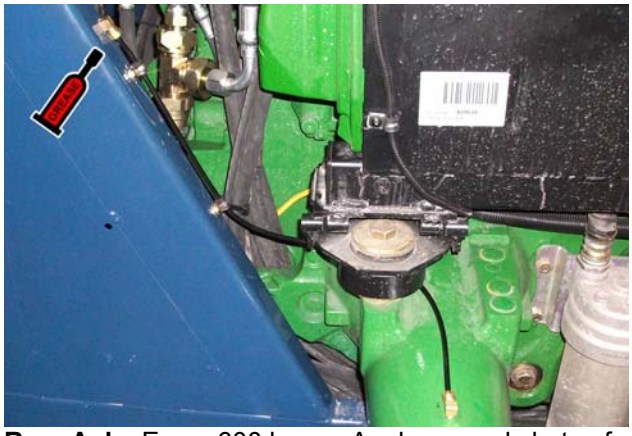

GREASE

Auto-Steer.



Auto-Steer.



Rear Axle. Every 600 hours. Apply several shots of multi-purpose grease to fittings (both sides).

IMPORTANT

Follow the recommended lubrication schedule to help in maintaining the machine in good working order.

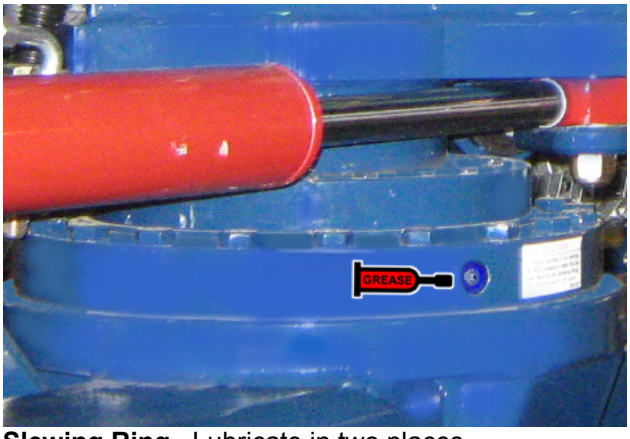
Slewing Ring.

IMPORTANT

The recommended lubrication procedure for the Slewing Ring must be followed to ensure the long working life of the unit. The Raceway System is provided with and initial lubrication of high quality lithium soap based grease KPN-25 to DIN 1825. The system can be re-lubricated.
Refer to the following pages for details.

Seals.
The Top Seal '**A**', and the lower Seal, protect the gap in the Bearing Raceway system from the ingress of dirt, dust, and moisture. Correct lubrication increases the effectiveness of the seals.

Operating Temperature.
The permissible operating temperature range is:
-13 deg.F to 176 deg.F. (-25 deg.C to 80 deg.C.)



Slewing Ring. Lubricate in two places.

LUBRICATION

Slewing Ring.

Lubrication of the raceway system.

Correct lubrication and regular maintenance are important to ensure the long life of the Slewing Ring.
The lubricant must perform the following functions:

- It must form sufficient lubricating film at the contact surfaces which is capable of supporting loads.
- It must seal the bearing on the outside(grease lubrication) and thus prevent the ingress of solid and fluid contaminants.
- It must dampen raceway noise
- It must protect the bearing against corrosion.

Grease types.
Data sheets from the lubricant manufacturers provide information for the selection of a suitable lubricant.
Important points to be considered when selecting the lubricant:

- Operating temperature range.
- Type of grease.
- Consistency.
- Speed parameter.
- Behavior in the presence of water.
- Pressure properties.
- Miscibility/compatibility.
- Storage life.

Operating temperature range.
The operating temperature range of a grease must cover the range of possible temperatures in the rolling bearing with a sufficient degree of safety.
The possible operating temperatures must not exceed the upper and lower limiting values.
The lubricant should be selected such that the highest possible operating temperature is 20deg.C below the upper limiting value, and the lowest possible operating temperature is 20deg.C above the lower limiting value.

IMPORTANT

The permissible operating temperature for standard catalogue
Slewing rings is: -13deg.F to 176 deg.F. (-25deg.C to 80deg.C).

Consistency.
Lubricating greases are divided into consistency classes. NLGI classes 1, 2 and 3 are recommended for rolling bearings.
Rolling bearing greases which do not soften at high temperatures (NLGI 1), and which do not stiffen up at low temperatures (NLGI 3), should be used.
When selecting the grease, the operating speeds should also taken into consideration.

Behavior in the presence of water.
Any water in the lubricant has a detrimental effect on the operating life of the bearing.

Pressure properties.
A sufficiently high viscosity at operating temperature must be achieved for the formation of a lubricating film capable of supporting the load.
INA recommends the use of lubricants with EP (extreme pressure) additives and high base oil viscosities.

Miscibility/compatibility.
It is possible to mix greases provided the following preconditions are met:

- Same base oil is used.
- Thickener types must match.
- Similar base oil viscosities (the difference must no more than one ISO VG class).
- Consistencies must match (NLGI classes).

The lubricant manufacturer should be contacted if there is any doubt.

IMPORTANT

If greases are mixed with each other, the compatibility of the lubricants must always be checked:

- With each other.
- With corrosion protection media or preservatives.
- With plastics (elastomers and duroplastics).
- With light and non–ferrous metals.

Further details are available on request from the manufacturer.

Storage life.
Lubricants age naturally due to environmental influences. It is therefore the users responsibility to follow the directions given by the lubricant manufacturer.

The greases used in INA Slewing Rings have a mineral oil base and experience has shown that they can be stored for up to 3 years without deteriorating providing the following important conditions are met:

- Closed storage room.
- Temperature between 32deg.F and 104deg.F. (0deg.C and 40deg.C).
- Relative atmospheric humidity 65% or less.
- Security from chemical agents (steams, vapours, fluids).
- Sealed slewing rings.

If slewing rings are stored for longer periods of time, the frictional resistance can be considerably higher than in freshly greased bearings.
The lubricity of the grease may have deteriorated; the bearings should then be re-lubricated.

Slewing Ring.

Initial Grease Lubrication.
INA Slewing Rings are supplied with an initial grease lubrication of a high quality lithium complex soap base grease KPN2N-25 (DIN 51825).
The free space in the raceway system in the bearing is filled with grease. A grease with an operating temperature range of -13deg.F to +302deg.F(-25deg.C to +150 deg.C), is suitable.

Re-lubrication Interval.
Re-lubrication intervals are dependant on :

- Operating conditions.
- Environmental issues such as contamination, water etc.
- The design of the Slewing Ring.

The re-lubrication interval can only be precisely determined by carrying out tests under operating conditions. If comparable results are not available, the guide values shown below can be used.
Values shown are based on the following conditions:

- Operating temperature 158deg.F (70deg.C).
- Circumferential speed 0,5m/s.
- Low to medium loading.

Recommended re-lubrication period.

Heavy contamination, operating in field conditions. Harvesters, Cranes, Diggers. Excavators.	**100** to **200** hours.

The raceway system of a slewing ring should always be re-lubricated in the following instances :

- After each cleaning eg. spraying with water, steam etc.
- Before and after long stationary periods, such as inactive winter months, if high levels of moisture occur.

Grease operating life for the raceway system.
If re-lubrication is not possible, the operating life is a decisive factor.
Experience of a large number of applications shows that guide values for the grease operating life can be taken as twice that of the guide value for the re-lubrication interval.

At operating temperatures over 158deg. F (70deg.C), both the re-lubrication interval and the grease operating life are reduced.
In order to ensure operational safety, the grease operating life should not exceed 3 years.

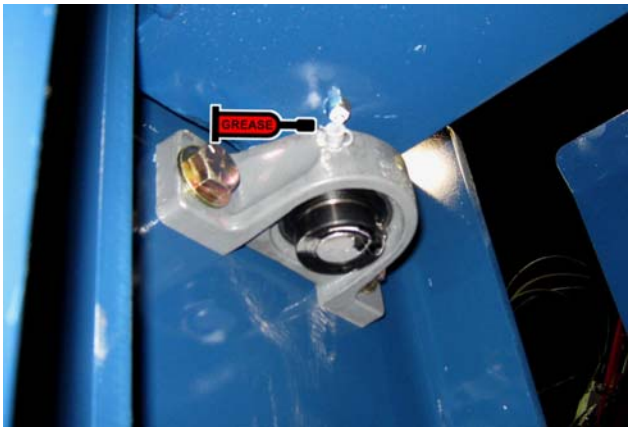
IMPORTANT
When using a pressure washer do not allow the water jet to be pointed at the Slewing Ring seals. The high pressure water will force dust, dirt and contaminants past the seals and into the raceway. This will result in premature failure of the bearings in the raceway system.

Raceway System.
Re-lubrication procedure.
Contaminants such as dirt, dust, spray water and contaminants are forced out by the re-lubrication procedure.

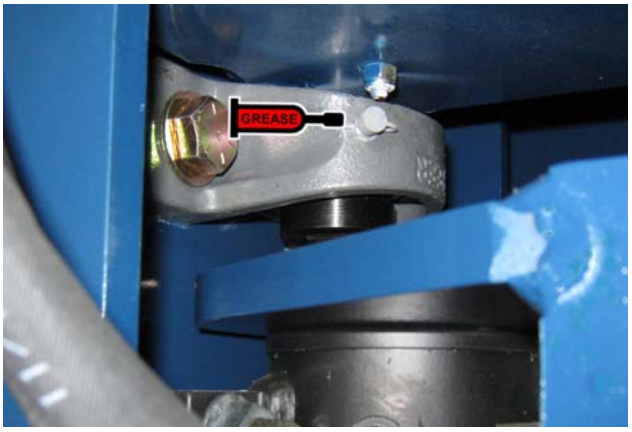
- It is preferred that the same lubrication as used for the initial operation should be used for re-lubrication.
- Re-lubrication should always be carried out while the slewing ring is warm from operation.
- Clean the lubricating grease fittings.
- Press grease into the lubricating grease fittings in turn, until a collar of fresh grease forms all the way around both of the seals (turn one bearing ring slowly during this process).
- The used grease must be able to flow out unhindered.
- Ensure that all feed ducts are full of lubricant before returning the slewing ring to operation.

Lubricants.
Suitable lubricants for the raceway system are shown below.
Depending on operating temperatures, grease with base oils up to ISO VG1500 can be used to improve the lubricating film in the slewing rings which are driven with very high loads and at very low speeds (swivelling operation).
If these conditions occur, contact INA engineering service.

Raceway Lubricant.	**Manufacturer**
Aralub HLP2	Aral.
Energrease LS-EP2	BP
Gilssando EP2	DEA
EPEX EP2	ELF
BEACON EP2	ESSO
Centoplex GLP 402	Kluber
Mobilux EP2	Mobil
Alvania EP2	Shell
Retinax LX 2 (INA Designation:SM03)	Shell



Pallet Injector. Top Pivot Bearing.

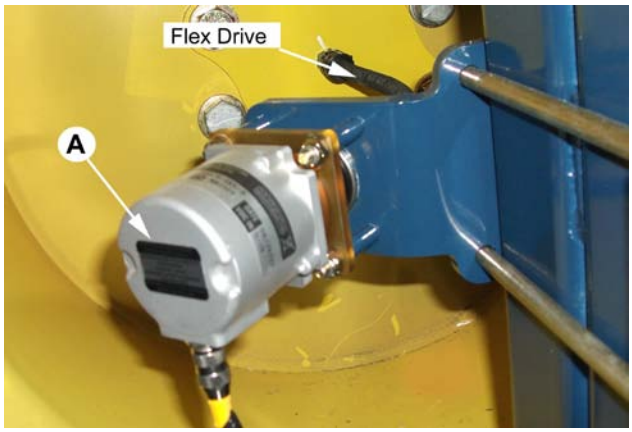


Pallet Injector. Lower Pivot Bearing.

- Regularly lubricate all pivot bushings, catches and links on the Injector System.

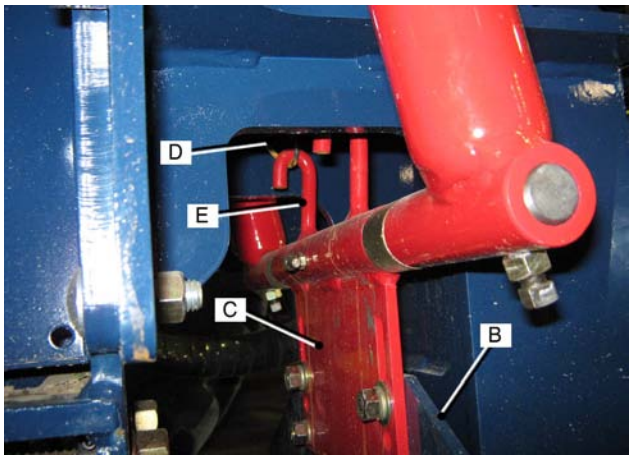
Cut Length of Sod

The Wheel Driven Encoder '**A**', measures the distance traveled, and this, in conjunction with the Cut-Off Sensor and the programmed 'cut length', determines the length of cut. Maximum cut length of sod is 80 inches. This can be adjusted, to suit sod conditions, to a minimum of 60 inches.
See Section 2 for length of cut adjustment.



Cut-Off Blade.

It is essential that the Cut-Off Blade '**B**', is kept 'sharp'. As the blade wears, and also when it is sharpened, its depth will be reduced.
To compensate for loss of blade depth, holes in the Blade Holder '**C**', allow for adjustment,
The Blade Holder is tensioned by two springs '**D**' that position the blade, when not operating, at 15 degrees from vertical.
This allows the blade to swing forward when cutting.
The blade angle is set by bending the Spring Attachment Hooks '**E**'.
Check that the edge of the Cut-Off Blade Mount does not hit the sod on the 'down' stroke, as this will damage the sod and cause problems when the sod is laid.



NOTE

A 'serrated' blade is available for use in soft soil, or excessive thatch. This blade will give a cleaner more positive cut in these conditions.

Cut-Off Springs. Tension Adjustment.

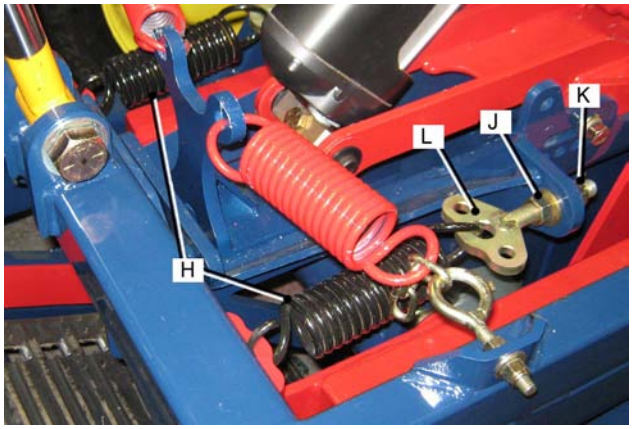
NOTE

There should be only 'light' contact between the Cut-Off Frame '**F**', and the 'Bump' Stops '**G**', excessive pressure will cause the frame to 'bounce' on the Stops, resulting in premature wear to the bearings in the frame.

Tension on the Cut-Off Springs '**H**', is set at the factory, for 'average' cutting conditions.
The Cut-Off Blade depth should only be deep enough to give a clean cut, whatever thickness of sod is being cut.

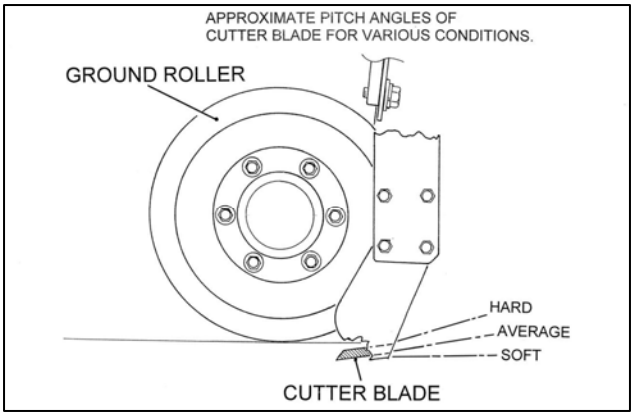
To adjust the Cut-Off Springs:

- Release the Locknuts '**J**'.
- Adjust the Nuts '**K**' on the Spring Adjusters '**L**', until there is just a 'little' tension in the Cut-Off Tension Springs '**H**'.
- Turn the adjuster nuts '**Clock-wise**' to **increase** spring tension, and '**Counter-clockwise**', to **decrease** tension.
- Tighten the Locknuts.



Pitch Angle.

Pitch Angle is the angle that the Cutter Blade makes relative to the ground. It is set at the factory for 'average' turf conditions. Adjustment is provided to improve cutting performance, in soft or in hard soils.
In soft conditions the Pitch Angle should put the Cutter Blade almost parallel to the ground.
In harder soils the Pitch Angle should be increased to maintain the correct cutting angle and to prevent the Cutter Blade from coming out of the ground.

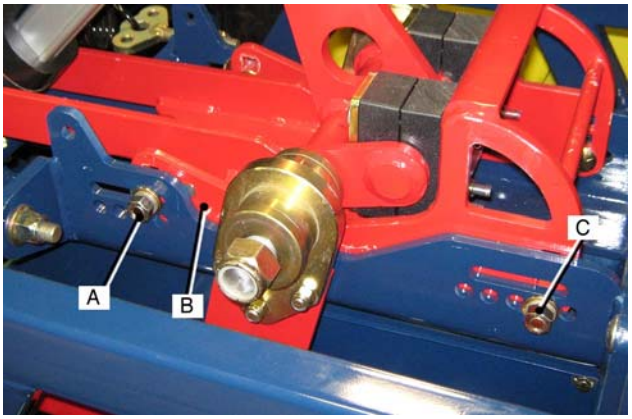


NOTE

The set-up of the Cutter Blade to the Conveyor Mat and the Ground Roller is important.
An 'extreme' Pitch Angle may require the Ground Roller to be adjusted, to maintain the recommended clearance between the Roller and the Cutter Blade.
Refer to the Ground Roller Adjustment section.

Pitch Angle Setting.

- Loosen the Lock-bolts '**A**', in the Adjuster Bracket '**B**'
- Remove the Locator Bolts '**C**'.
- To set the Pitch Angle for 'Hard' Soil : Pull the Adjuster Bracket '**FORWARD**' to '**increase**' the Cutter Blade Angle.
- To set the Pitch Angle for 'soft' Soil : Push the Adjuster Bracket '**REARWARDS**' to '**decrease**' the Cutter Blade angle.



IMPORTANT

The original Depth Adjustment Holes **must be used** when replacing the Locator Bolts.

- Re-fit and tighten the Locator Bolts '**C**'.
- Retighten the Lock-bolts '**A**'.

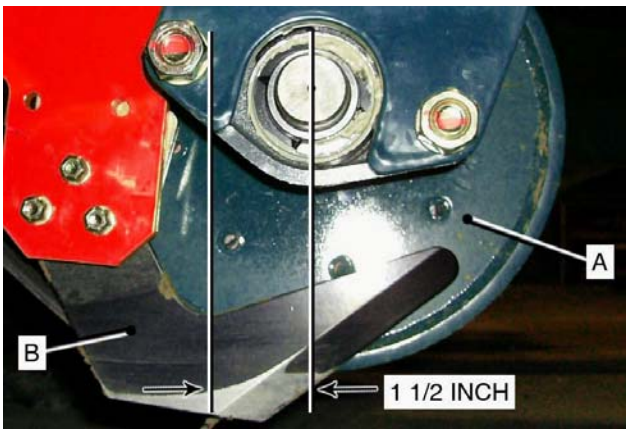
Ground Roller to Cutter Blade Setting.

The Ground Roller compresses the turf ahead of the Cutter Blade.
For average conditions the Roller to Cutter Blade setting is 1 ½ inches. This is measured, with the Cutter Blade at its '**full forward**' stroke position, from the center-line of the Ground Roller to the Cutter Blade.

Adjustment is made for various soils to maintain a quality cut.
For example:

- Peat/Muck Soils – Adjust to less than 1½ inches.
- Stoney Ground – Adjust to 2 to 2 ¼ inches.

See page 4-21 for adjustment procedure.

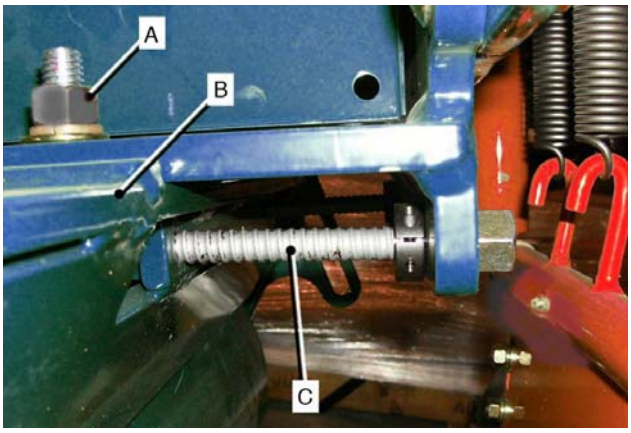


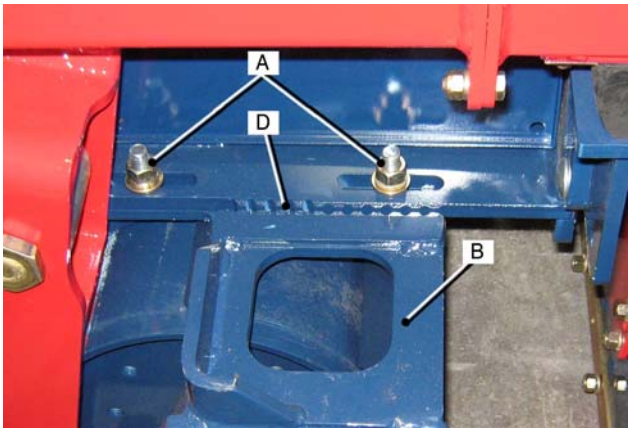
Ground Roller Adjustment.

To adjust the clearance between the Ground Roller and the Cutting Blade :

- Loosen the four Locknuts '**A**', sufficient to allow the Roller Bracket '**B**', to 'slide' freely.
- Turn the Adjusting Bolt '**C',** '**clockwise**' to **reduce** the Roller to Blade clearance.
- Turn the Adjusting Bolt '**C**' '**counterclockwise**' to **increase** the Roller to Blade clearance.

- To ensure that the Roller Bracket is 'square' to the Frame, turn the Adjusting Bolts 'evenly' on both sides of the frame. Check that the 'notches' '**D**', in the Roller Bracket and those in the Frame are aligned equally, on both sides.
- Fully tighten the Locknuts.
- To prevent dirt build-up on the Roller, adjust the Roller Scraper, to 1/32 in. clear of the Roller.



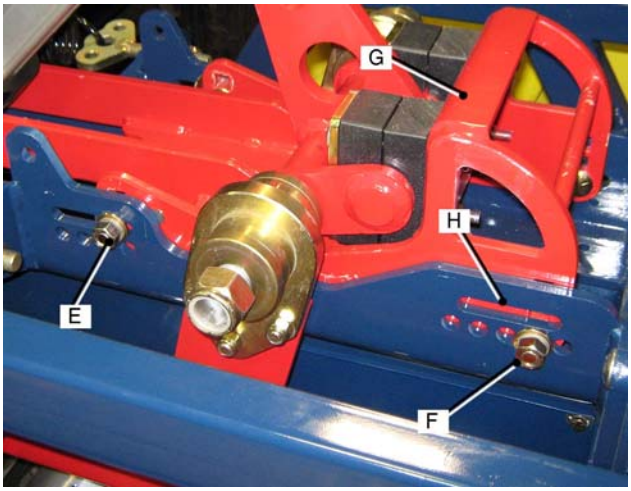


Depth of Cut.

During operation the Depth of Cut is controlled on the Cab Control Handle. See Page 2-02.
Further adjustment can be made manually.
The machine is set-up at the factory with a Depth of Cut setting for 'average' conditions.

If manual adjustment is required to the depth of cut :

- Loosen the Rear Adjustment Bolts '**E**'.
- Remove the Front Lock-bolts '**F**'.
- To '**decrease**' the Depth of Cut, lift the Adjustment Frame '**G**', '**UP**', and fit the Front Lock-bolts into the Adjustment Slot '**H**' and the 'lower' hole in the Adjustment Frame '**G**'.
- To '**increase**' the Depth of Cut, lower the Adjustment Frame, and fit the Front Lock-bolts into the Adjustment Slot and into the '**upper**' hole in the Adjustment Frame.
- Remove the Rear Adjustment Bolts '**E**', and fit them into the same, 'upper' or 'lower', hole in the Adjustment Frame '**G**', as the front Locator Bolts.



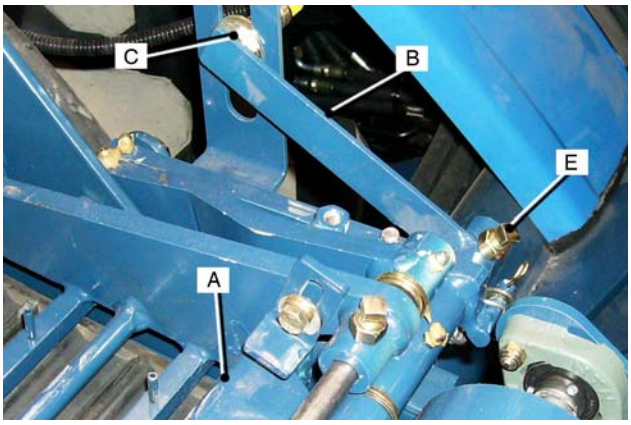
IMPORTANT

Do not attempt to install the front Lock-bolts in the **lower set of holes** in the Cutter Head Frame and the **top hole** in the Adjustment Frame, as the Adjustment Frame will foul against the Cutter Head Frame

ADJUSTMENTS

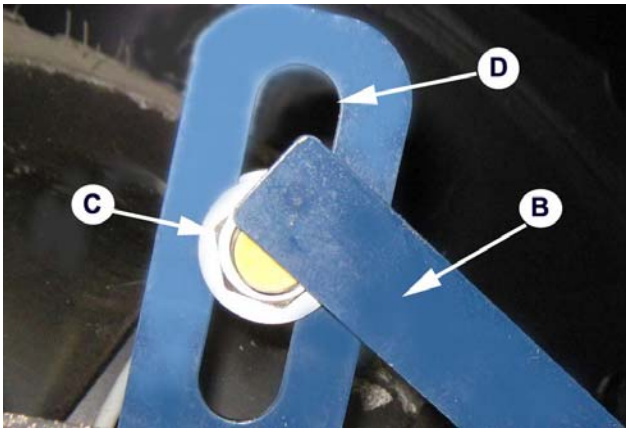
Roll 'END' Sensor.
Before the leading edge of the sod has reached the Starter Gate '**A**', the Roll 'end' sequence 'starts' with the Sensor Flag '**B**' positioned in front of the Sensor '**C**', (see adjustment procedure below).

As the Sod passes into the Starter Gate '**A**' the Sensor 'Flag' will rotate '**UP**' away from the Sensor '**C**'. When the trailing edge of the sod has passed the Starter Gate, the Sensor Flag will rotate '**back**', across the face of the Roll 'end' Sensor.



Sensor and Sensor 'Flag' Setting.

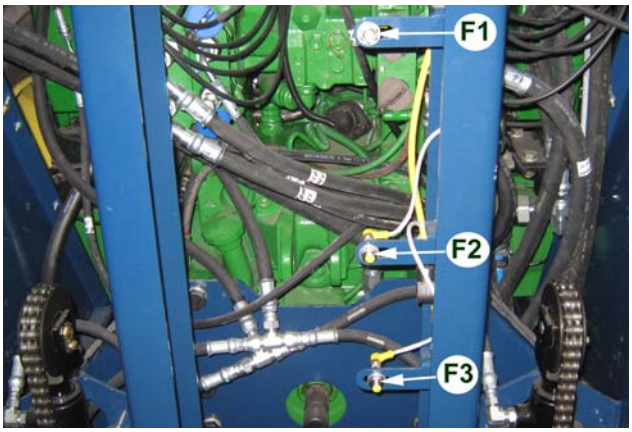
- Position the Sensor '**C**' in the center of the Slot '**D**'. Do not fully tighten the Locknuts.
- Loosen the Set Screw '**E**',(in the Sensor Flag Boss) and position the Sensor Flag so that it is covering the top half of the face of the Sensor. Tighten the Set Screw.
- Loosen the Locknuts on the Sensor Body. Adjust the Locknuts until the face of the Sensor is a maximum 8mm, but no closer than 2mm, from the Sensor 'Flag'. Tighten the Locknuts.



Pallet Lift Forks.

The Pallet Lift Forks are programmed to move 'down', from the 'upper' position, where two layers of sod are placed on the Pallet, to the 'mid' position, where one more layer is placed, then to the 'lower' position, where the remaining layers are stacked.

Refer to Section 2, Control Panel and Screen, for operating procedure.

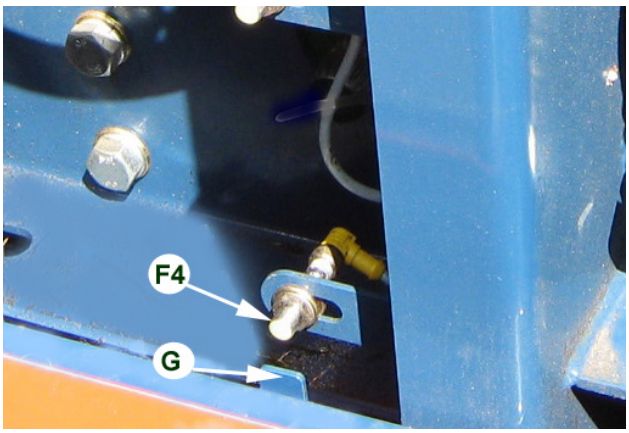


Pallet Lift Forks Sensors.

The Lift Forks Proximity Sensors '**F1** – Upper, '**F2**' – Mid, '**F3**' – Lower, and the Pallet 'Insert' Sensor '**F4**' must be adjusted to allow a gap of 1mm between the sensor face and the Pallet Lift Sensor Flag '**G**'.

NOTE

The 1mm setting is recommended because, as the pallet is loaded, the weight of the sod may tilt the Lift Forks Sensor Flag away from the Sensors.



SECTION 5

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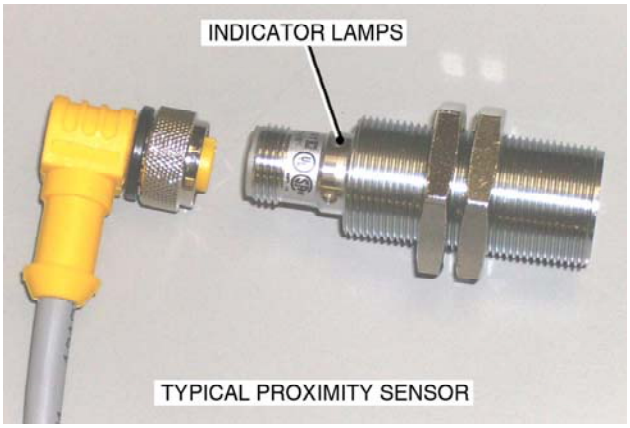
Section 5

Electrical System.

The design of the wiring/cable system simplifies the tracing of electrical faults, and if necessary, the replacement of the Cables.
The **'YELLOW'** cables, from the Main Electrical Control Box, are connected to Multi-Port Connector Blocks. See page 5-6.
The Cables from the 'Port Connections' to the Proximity Sensors, E-Stops, Transducers, Encoders and Solenoid Valves, are **'GRAY'.**
A **'GREEN** Indicator Lamp on each Multi-Port Connector Block indicates that power from the Main Electrical Control Box to the Block is **'ON'**. See page 5-5.
A **'YELLOW** Indicator Lamp, at each Cable 'port connection', indicates that the signal power is **'ON'** in the Cable connecting it to its particular function.



Proximity Sensors.

The Proximity Sensors have Power **'ON'** Indicator Lamps. Indicator Lamps allow the power loss at any Sensor to be quickly traced .
The threaded Connector Plugs are sealed, and designed to be trouble free, but should be checked periodically for tightness, and for moisture or corrosion in the Connectors.

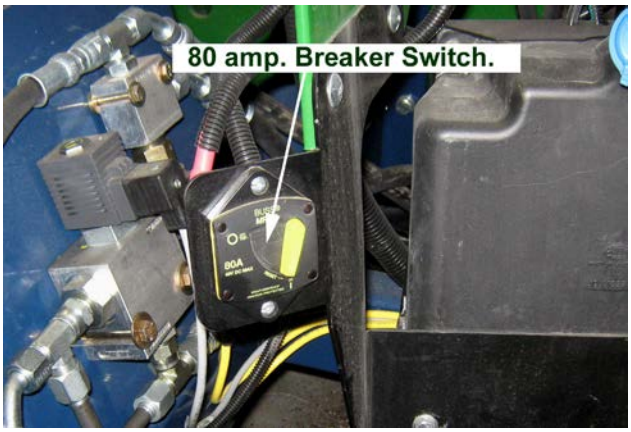
IMPORTANT

- If a problem persists with the operation of the machine, due to electrical faults, it is recommended that you contact your Kesmac Dealer, or the Factory Service Department.
- The diagnosis and/or repair of electrical problems that are beyond the scope of this manual, **must be done ONLY BY FACTORY TRAINED TECHNICIANS, using the proper diagnostic equipment.**

CAUTION

The Battery Cables ***MUST*** be disconnected before **doing any welding procedures on the machine.** Failure to follow this instruction will result in serious damage to the Electrical System Components.

80 Amp Circuit Breaker/Switch.



IMPORTANT

Switch the 80amp Breaker/Switch **'OFF' if:**

- Doing repair work on the electrical system.
- If the harvester is to be stored for a prolonged period.
- **Disconnect both Battery Cables** when doing any welding on the machine

If power is lost to the electrical system :

- Check the 80 amp Circuit Breaker/Switch. It is located outside of the Cab, on the RH side.

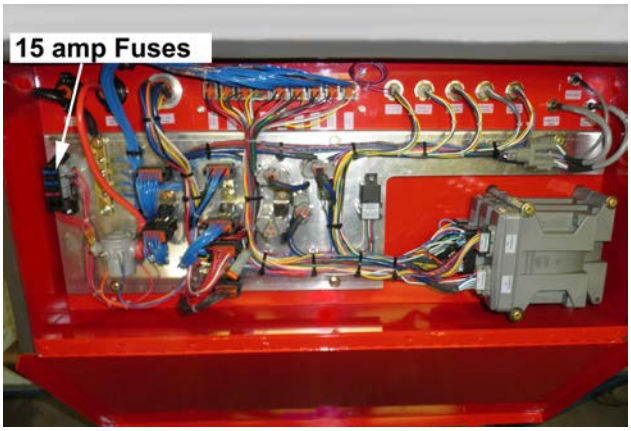
If the Breaker persists in opening :

- Check for a 'short', or poor connection, in the cable between the Breaker/Switch and the Main Electrical Control Box.

If this is not the cause :

- Check the wiring connections, and the Power System Relay, in the Main Control Box.

Main Control Box. Fuses.
System and Controllers 15amp Fuses.



CAUTION

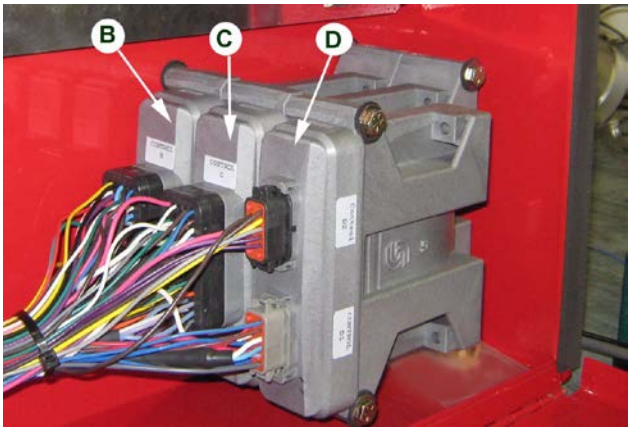
Under no circumstances must a Fuse be by-passed or one of the incorrect value used.
This will result in damage to the electrical components, and could result in a fire causing personal injury.

The Fuses, are at the left end of the Control Box.
If a Fuse is 'blown', and persists in doing so:

- Check the wiring from the Fuse to the cable connection in the Control Box.

If the fault is not in the Control Box Wiring, further checks as shown on the following page will be necessary

Controllers.
Controllers '**B**', '**C**' and '**D**', are pre-programmed and **must not be tampered with.**
They **must be installed** in their correct locations.
LED Indicators show that power is at the Controlle.



Cab Screen (Controller 'A') Displays - !!! NO CAN BUS !!!.
If the Cab Control Screen displays - '**!!NO CAN BUS!!'** it indicates one of the following :

- Loss of Power to the Controllers. Check the LED Indicators. If they are **'ON',** the Controller may be faulty. If they are not **'ON'** check the wiring, to restore power.
- Loss of 'signal' from a Controller to the Screen.

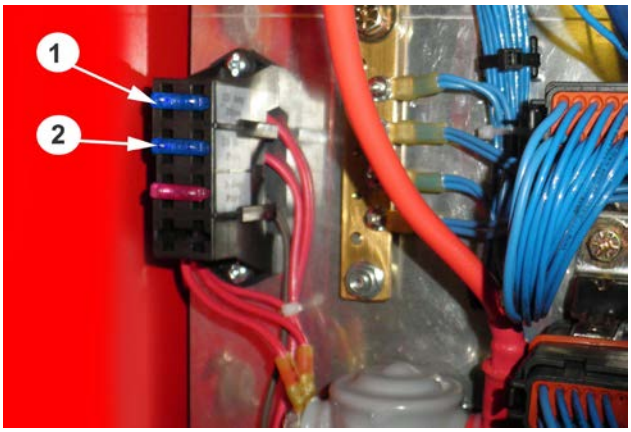
If the above checks fail to restore the functions, call your Dealer or the Factory Service Department.

The wiring system is complex, and beyond the scope of the Operator's Manual, apart from the items listed below, and in the following pages, that may require attention, but do not require specialized knowledge or diagnostic and testing equipment.
The operator should not attempt any service or repair to the electrical system, other than the checks specified.

ITEM.	LOCATION
Fuses	Left side of Main Control Box
DIN Connector.	Solenoid Valves : Auto-Steer Solenoid. Head Lift – Relief Valve.
Proximity Sensors	Cut-Off.. Head 'Down'. Slab 'end'. Roll Flap (tooth count). Pallet Lift. 'UP' 'MID' 'DOWN'. Pallet Inject Pallet Lift Load. Pallet 'Home' – 'Away' Gate 'Open – Close'. Index Conveyor Cleats.

See pages 5-08 and 5-09 for the locations of the Proximity Sensors and Rotary Encoder.

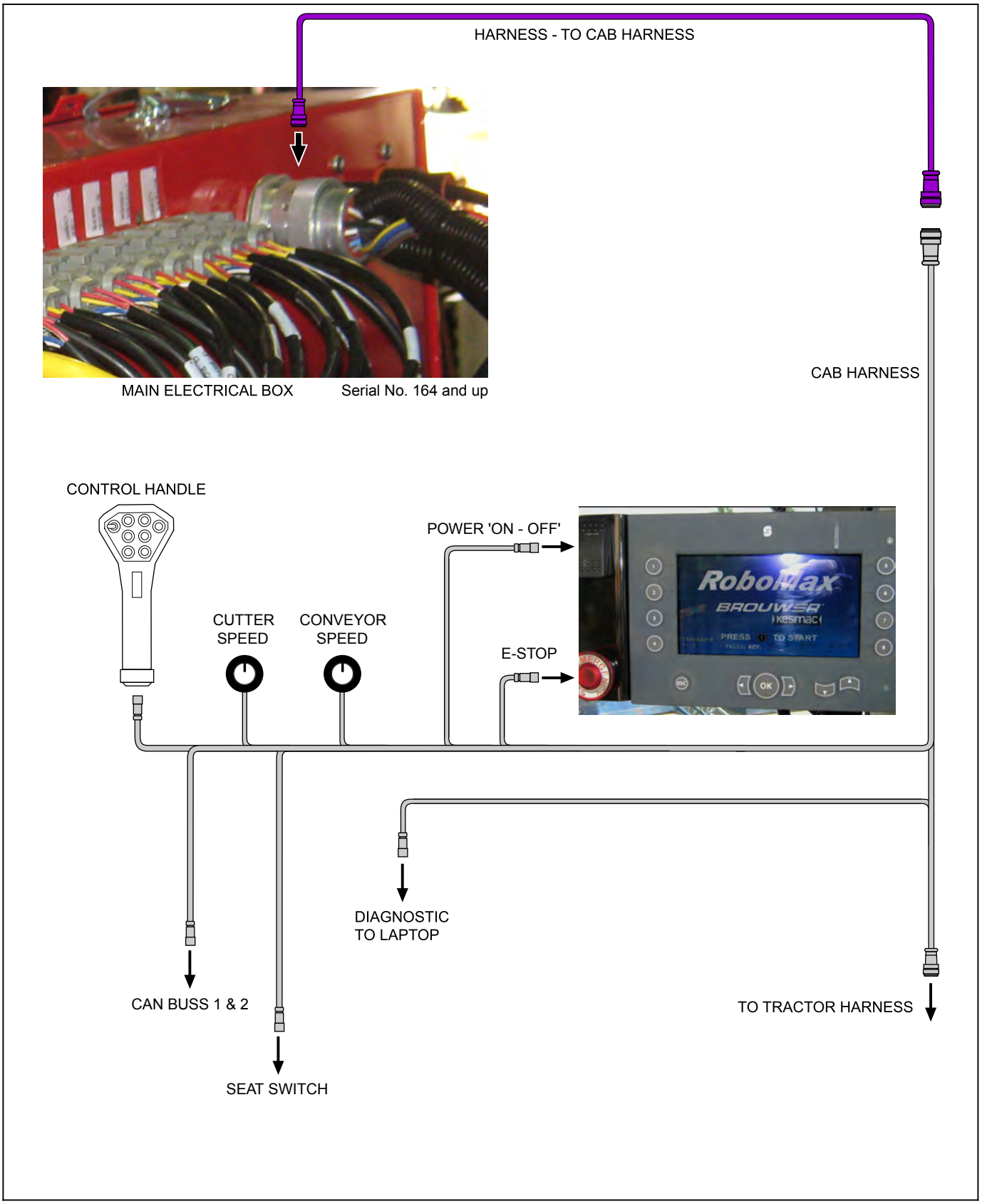
Rotary Encoder	Wheel Encoder. Cut Length.



Fuses. (15 amp).

Fuses. (15amp).	If a Fuse fault is indicated **('blown) :**
1. System.	There will be no power to the computer. The system will be shut down. **NOTE:** No power to the system. Check that the main power switch is '**ON**'.
2. Controllers 'B', 'C', 'D'.	Check for ; damaged wires; Bad connection; A 'short'; Faulty switches.

Cab Wiring Harness and Connection to the Main Electrical Control Box.



Cab Wiring Harness. Serial No. 164 and up.

Main Electrical Control Box - Cable 'Output' Connections.

The cable connections from the Control Box to the Multi-Port Connector Blocks, and other functions, are shown. It is imperative that if a cable is disconnected from the Control Box, it is labeled, to ensure that it is reconnected correctly. Cable Connections should be checked frequently, for tightness.

Cable Connections.

1. To CAN BUS 2.
1a. To Turn Smart Cylinder.

2. Encoder

3. R8.

4. M4.

5. M8

6. F4.

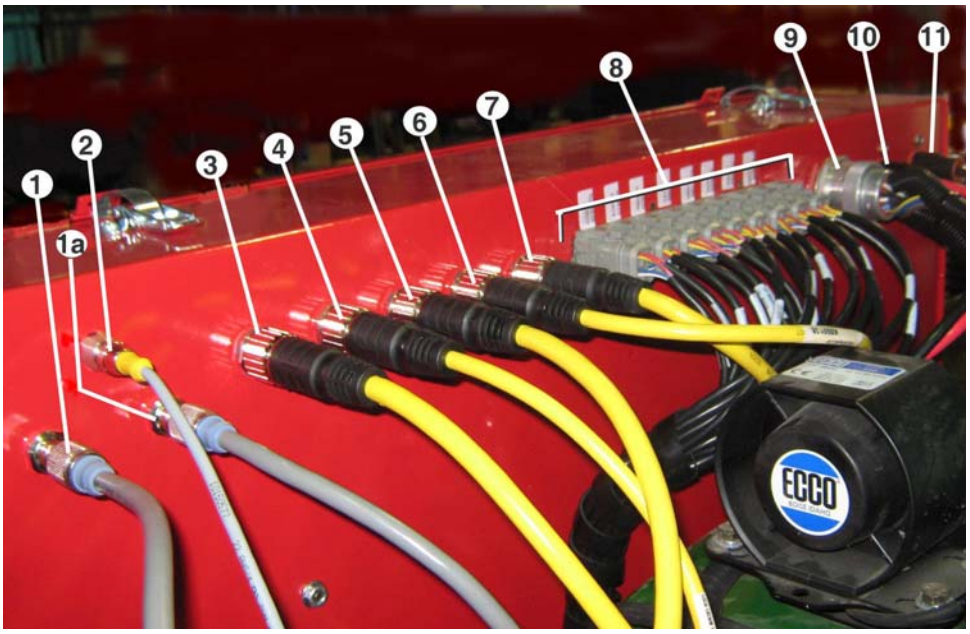
7. F8.

8. PVG. Control Valves.

9. To Cab Harness.

10. Power from 80amp breaker.

11. Ground.



Rear of the Main Electrical Control Box

Refer to Pages 10, 11 and 12 for cable diagrams.

IMPORTANT

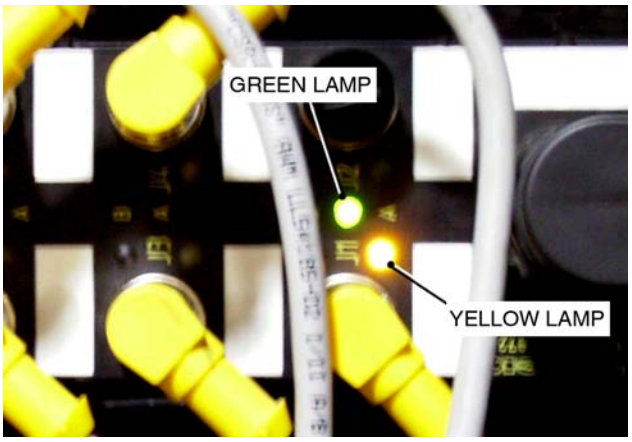
Do not direct the water jet from a high pressure washer at electrical components.

Multi-Port Connector Blocks.

A **'GREEN'** lamp indicates there is power to the Connector Block.
A **'YELLOW'** Lamp indicates that Signal Power is going from the 'PORT' Connection, via the Cables, to the :

- Proximity Sensors.
- Rotary Encoders.
- E-Stops.
- Valve Bank Solenoids.

The cables to and from the Connector Blocks are easily identified and can be quickly checked.
Indicator Lamps in the Proximity Sensors verify that Signal Power is going to the Sensor. See page 5-01.
Refer to page 5-13 for example of 'fault' tracing.



Multi-Port Connector Blocks.

No.1. Front Eight Port Block. (F8)
- J1. Relief Valve.
- J2 Head 'DOWN'.
- J3. Down Pressure.
- J4. Cut-Off.
- J5. Not used.
- J6. Work Light.
- J7. Auto-Steer.
- J8. Light.

No.2. Rear Eight Port Block. (R8)
- J1. Pallet Inject 'HOME'.
- J2. Pallet Inject 'AWAY'.
- J3. Load 'UP'.
- J4. Load 'DOWN'.
- J5. Drop 'HOME'. (UP).
- J6. Drop 'AWAY. (DOWN).
- J7. Work Light.
- J8. Dispenser 'Safe'. (Optional Pallet Injector).

No.5 Rear Four Block (M4).
- J1. Pallet Position 'TOP'.
- J2. Pallet Position 'MID'.
- J3. Pallet Position 'LOW'.
- J4. Pallet. Load Forks.

No.3. Front Four Port Block. (F4)
- J1. Auto-Steer..
- J2. Auto-Steer.
- J3. Temperature Sense.
- J4. Fan Relay.

No.4. Right Mid. Eight Port Block. (M8)
- J1. Lift Pressure Switch.
- J2. Roll End.
- J3. Conveyor speed.
- J4. E–Stop.
- J5. Index Conveyor position.
- J6. Not used.
- J7. Gate 'OPEN'.
- J8. Gate 'CLOSED' Pressure Switch.

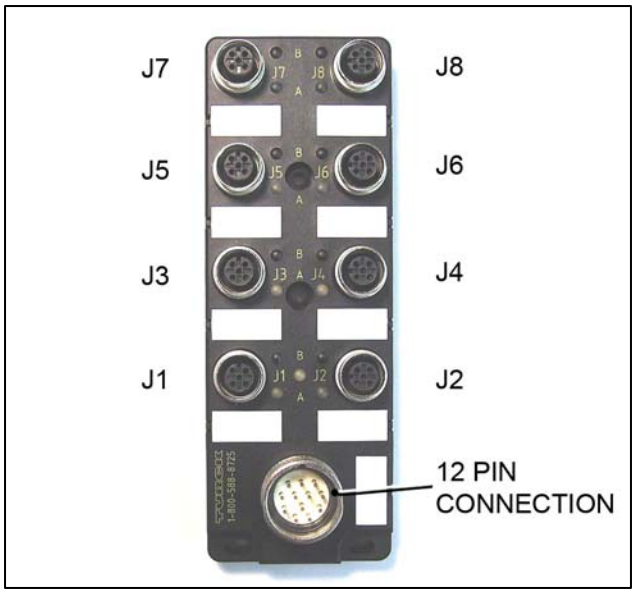
Cable Identification.

Typical Multi-Port Connector Block.

The Connector Block 'outputs' are numbered J1 to J8, or J1 to J4, as listed above.
See page 5-05, for the Connector Block Power Indicator Lamps :
- **'GREEN'** for Power **to the Block.**
- **'YELLOW'** for Signal Power **from the Connector Block** to the function.

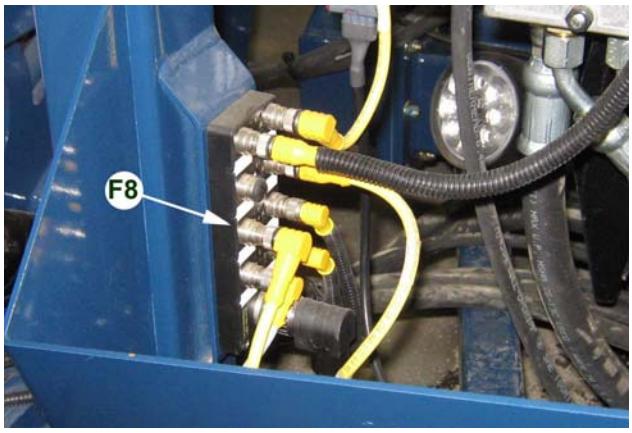
The Power Cable '**IN**' to the 12 Pin Connections is 'YELLOW'

To prevent cables from being connected to the wrong 'PORT', they are labeled showing the 'PORT' number and its function.

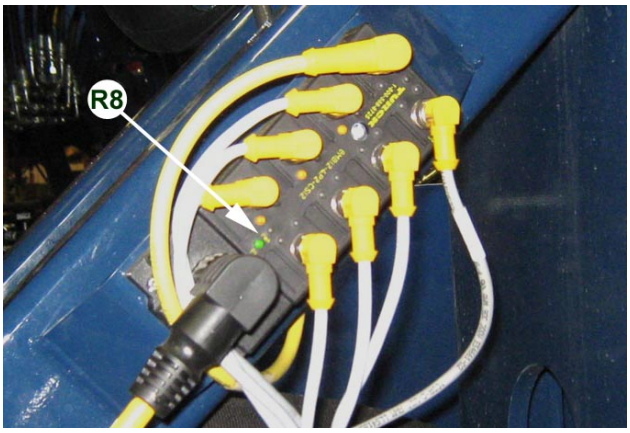


Typical 8-Port Connector Block.

Multi-Port Connector Blocks.

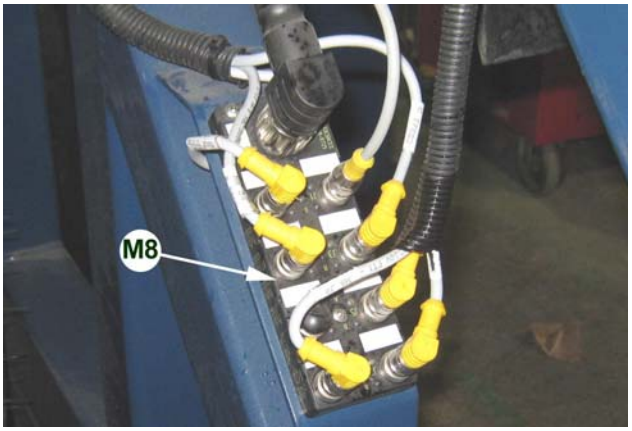


No.1. Front 8-Port Block. (F8).



No.2. Rear 8–Port Block. (R8).

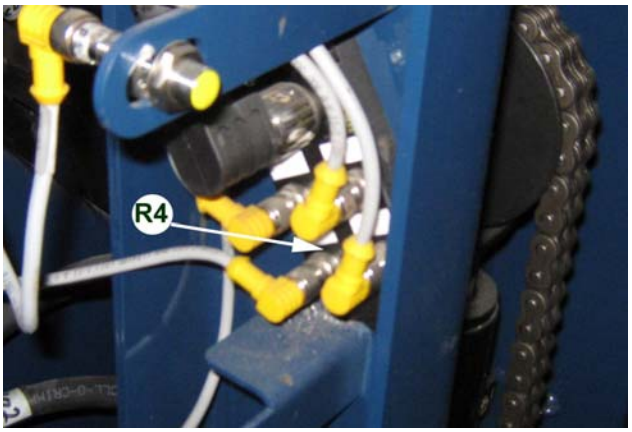
No.3. Front 4–Port Block. (F4).Left side.



No.4. Right Mid. 8–Port Block. (M8).

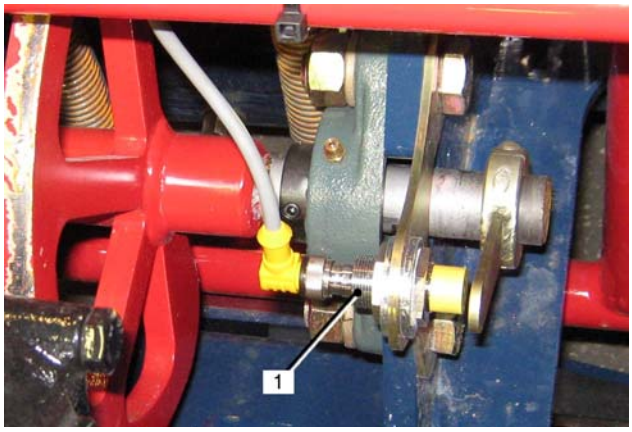
NOTE

Refer to pages 10, 11 and 12 for Electrical Diagrams.

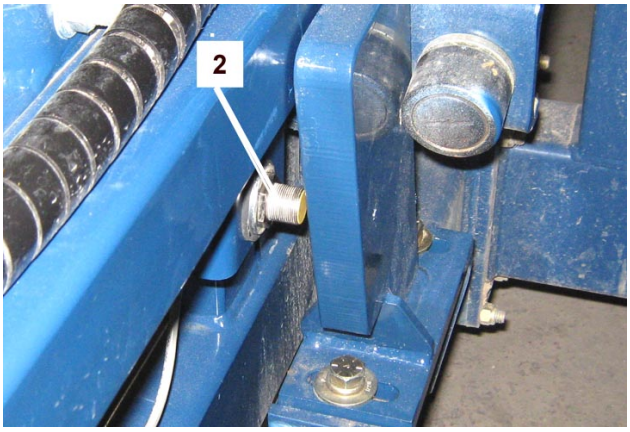


No.5. Rear 4 – Port Block. (R4)

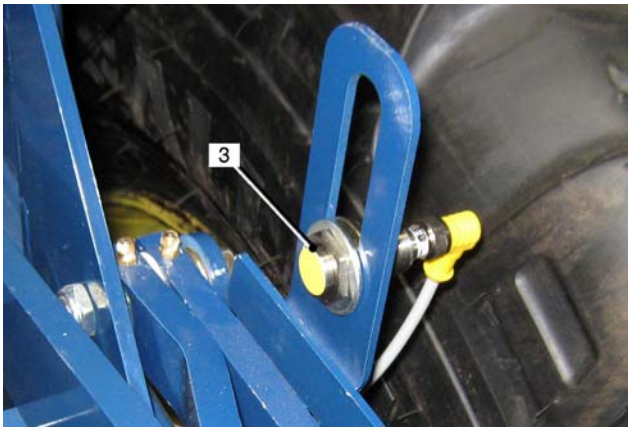
Proximity Sensors



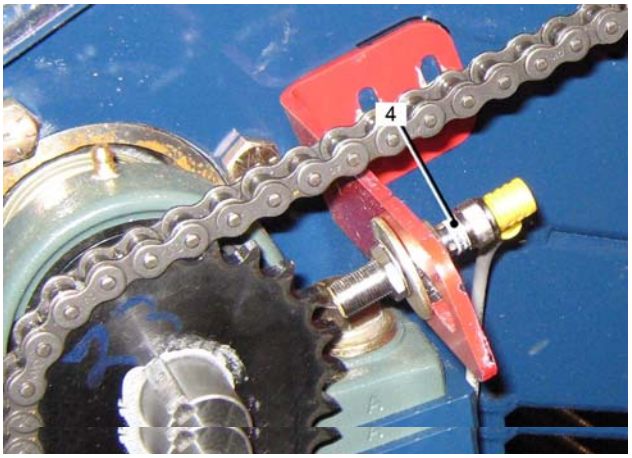
1. Cut-Off Sensor.



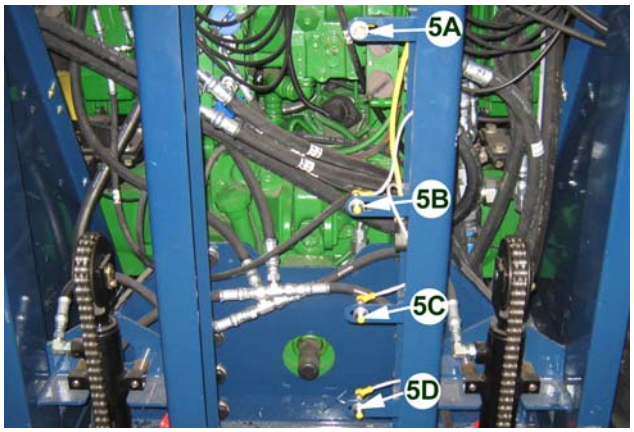
2. Head 'DOWN' Sensor.



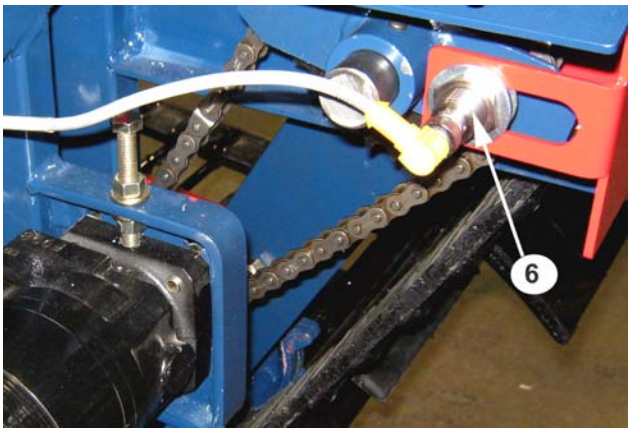
3. Starter Gate 'Slab End' Sensor.



4. Roll Flap (Tooth Count) Sensor.



5A – Pallet 'UP'. **5B** – Pallet 'MID'. **5C** – Pallet 'DOWN'
5D – Pallet 'INJECT'.



6. Index Conveyor 'CLEATS' Position Sensor.

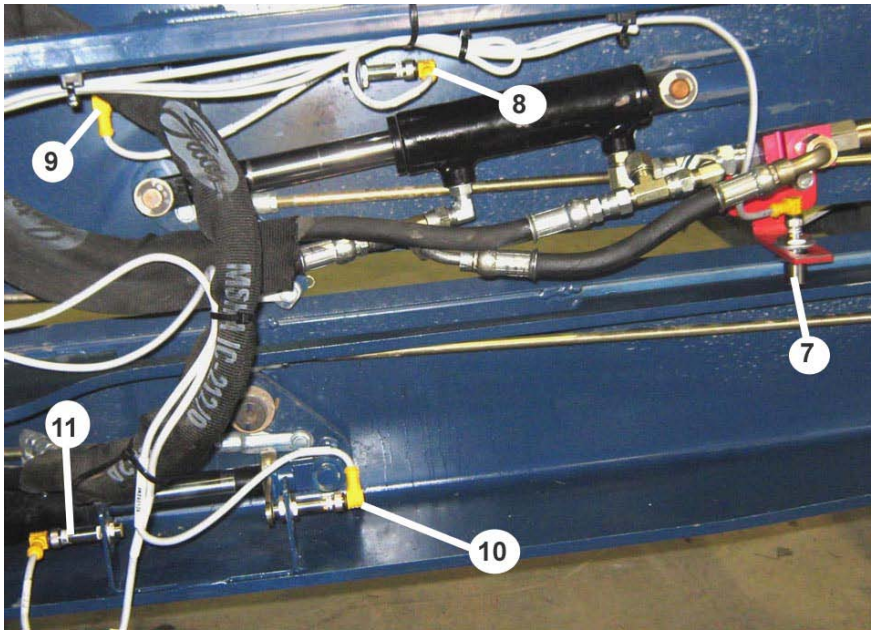
7. Pallet Inject - 'HOME/AWAY'.

8. Load - "CLOSE".

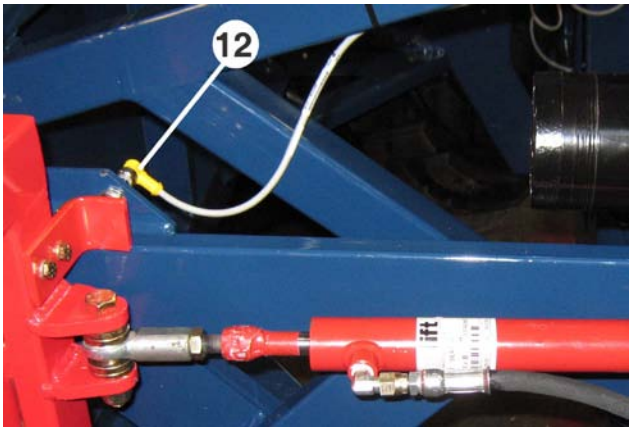
9. Load - 'OPEN'.

10. Pallet - 'DROP' Open.

11. Pallet - 'Drop' Close.



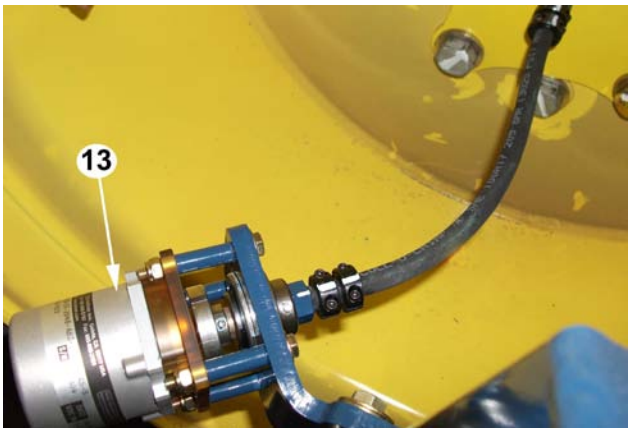
12. Gate - 'Open/Close'.



IMPORTANT

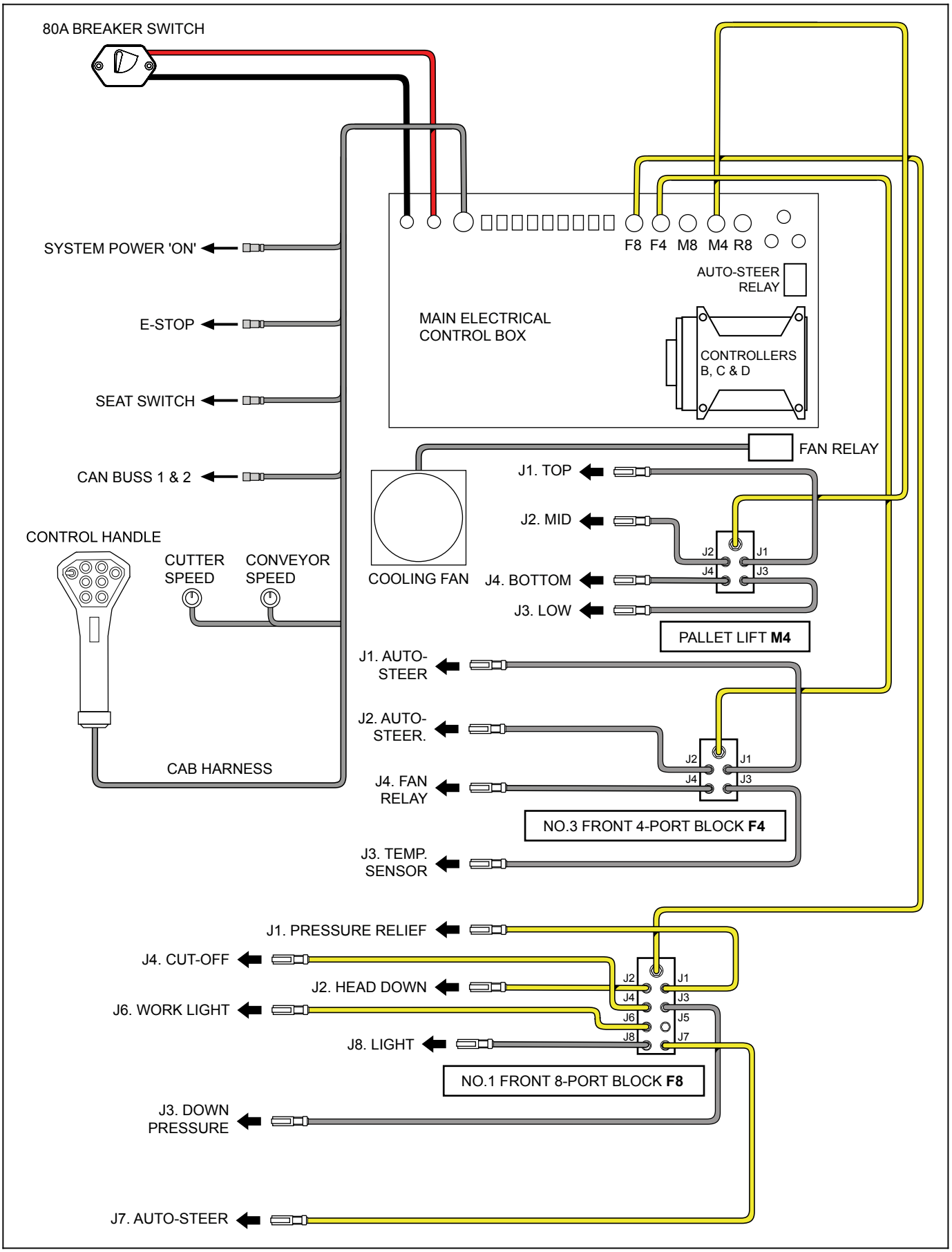
Check regularly the sensors cable connections for tightness.
Clean dirt and debris from face of sensors
Check the 'Gap' to the target component, not to exceed ¼ inch. (6.35mm).

13. Wheel Rotary Encoder – Cut-Off

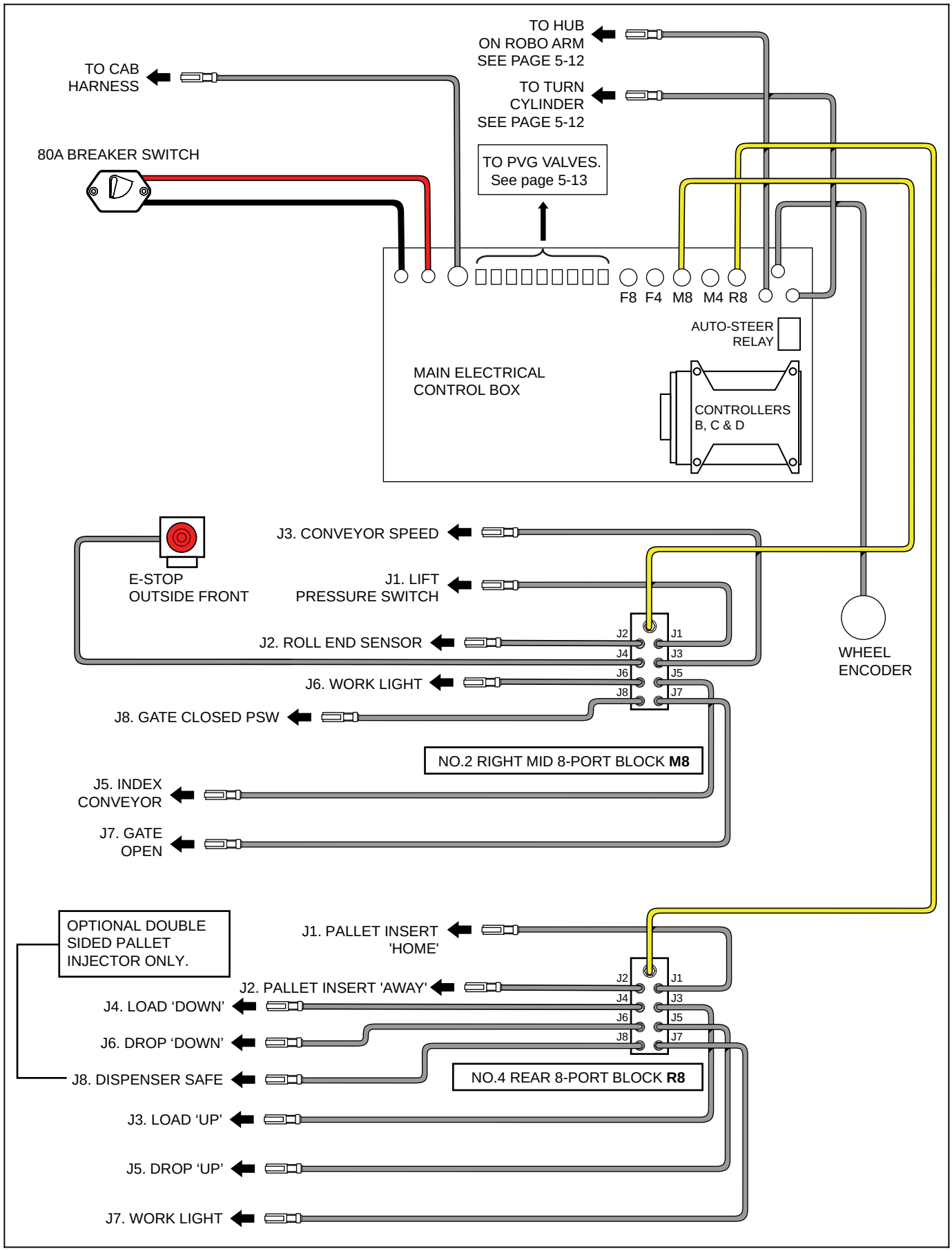


NOTE

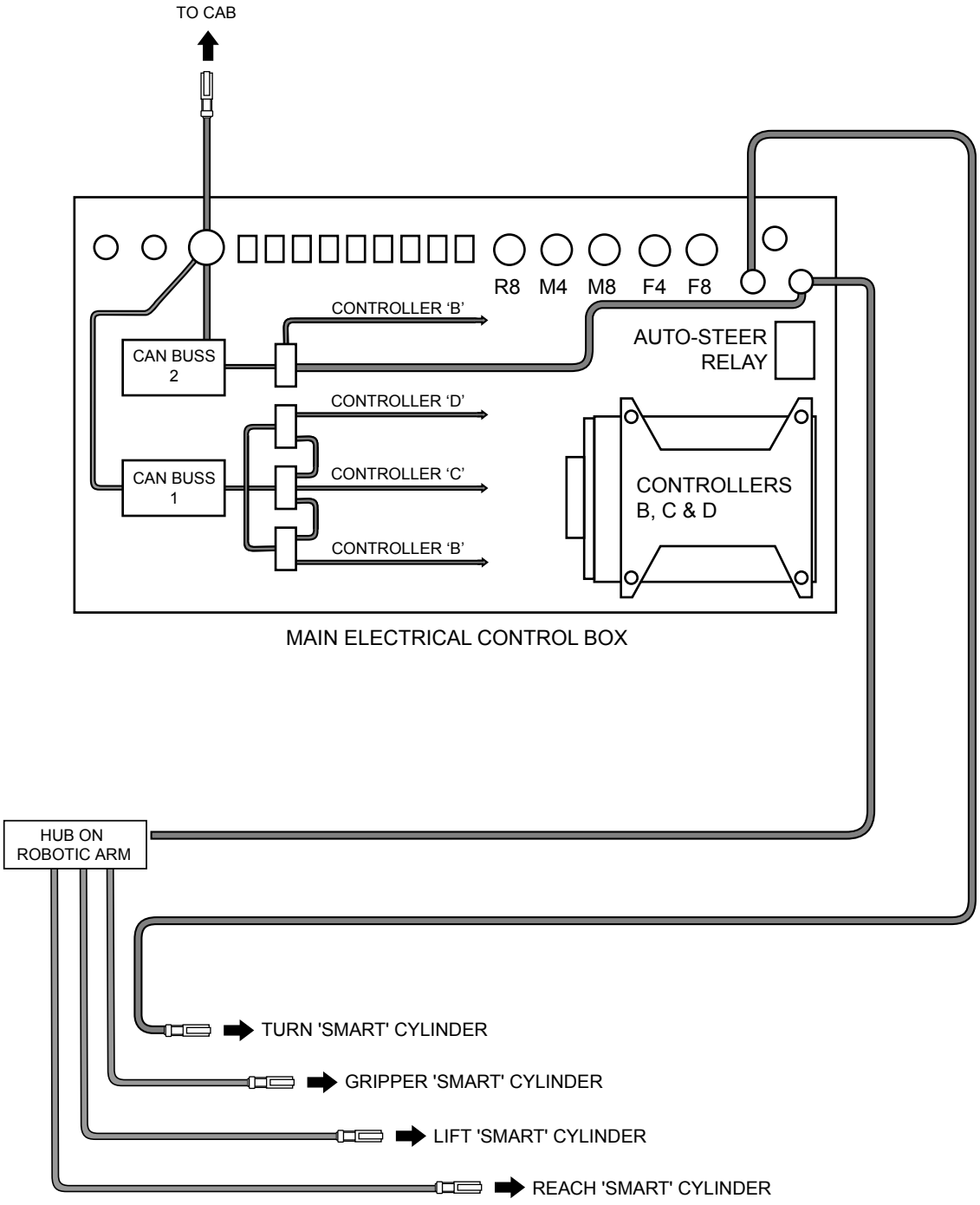
The Cut-Off Rotary Encoder is a sealed unit.
Do not attempt to service or repair.



ELECTRICAL SYSTEM DIAGRAM. Sheet 1 Serial No. 164 and up.



Serial No. 164 and up. **ELECTRICAL SYSTEM DIAGRAM. Sheet 2**

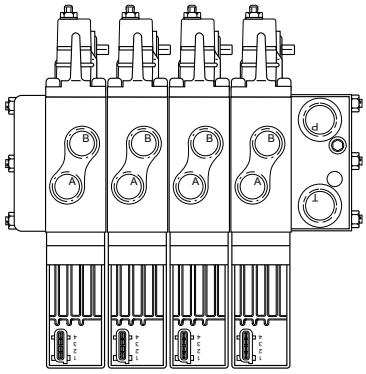


ELECTRICAL SYSTEM DIAGRAM. Sheet 3 Serial No. 164 and up.

Electrical System.

PVG. Control Valves - Electrical Connections from the Main Control Box.

4–Bank PVG Control Valves (From Tractor).



1. Pallet Load.

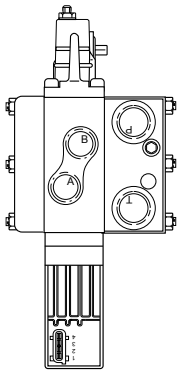
2. Pallet Drop.

3. Pallet Rotate.

4. Forks

1. 2. 3. 4.

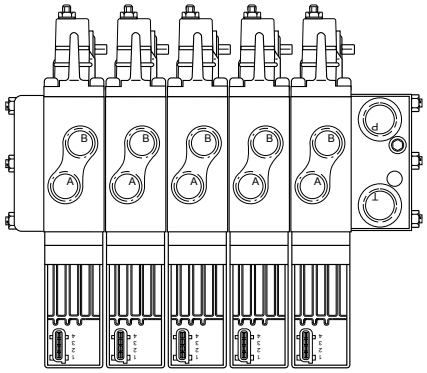
1–Bank PVG Control Valves (From Tractor).



1. Cutter Motor

1.

5–Bank PVG Control Valves. (From Aux' Pump).



1. Index Conveyor.

2. Eject.

3. Gate.

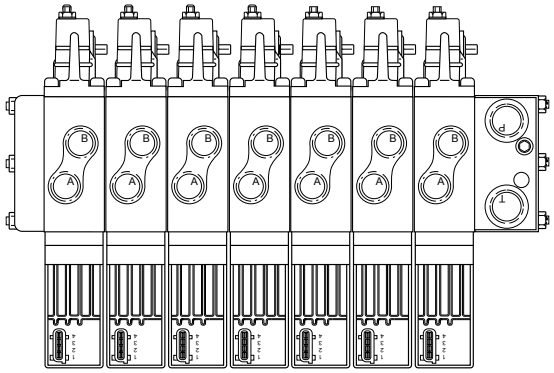
4. Cut-Off.

5. Conveyor.

1. 2. 3. 4. 5.

---

7 – Bank PVG Control Valves. (From Main Pump).



1. Arm Rotate.

2. Arm Lift.

3. Arm Reach.

4. Gripper Head – Rotate.

5. Multi Grip.

6. Single Grip.

7. Squeeze.

1. 2. 3. 4. 5. 6. 7.

SECTION 6

Auto-Steer Set-Up.

Cutting 'Starting Strip'.	6-01
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Service and Adjustment.

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– Pilot Pistons.	6-11
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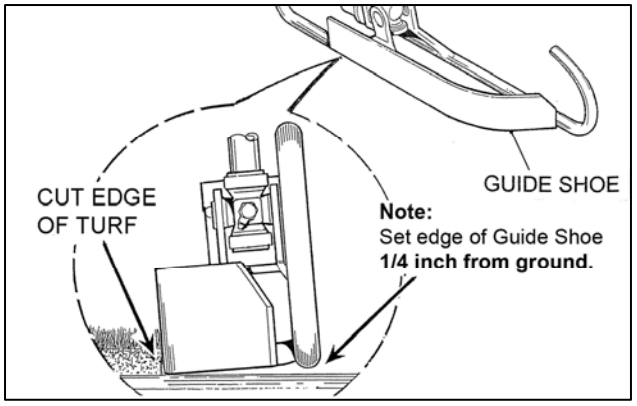
Re-set Cylinder.	6-17

Auto-Steer

When the machine is ready to commence harvesting, it is important that the Auto-Steer final set-up is carried out as shown in the following instructions.
The operator must read the operating instructions in Sections 2 and 3, before using the Auto-Steer.

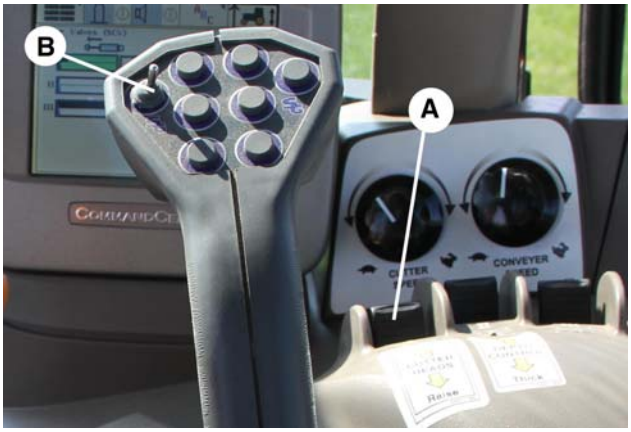


Cutting the Starting Strip.

The starting strip of turf must be cut '**manually steering**', This creates the turf 'edge' for the Guide Shoe to follow.

- Start the tractor, see Section 3, page 3-01. Select the Transmission Range and Gear recommended. Slowly release the Clutch Pedal.
- Lower the Cutter Head using Switch '**A**', on Control Console

Using **manual steering,** proceed to cut the starting strip. The starting strip **must be cut straight,** to ensure the correct operation of the Auto-Steer.



When the starting strip has been cut :

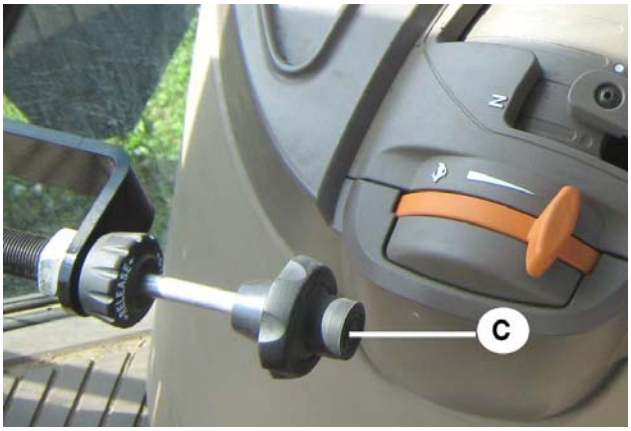
- Position the harvester parallel to the start strip, with the Cutter Side Blade aligned with the '**cut edge**' of the turf.
- Switch the Auto-Steer '**ON**', with Switch '**B**', on the Control Handle.

NOTE

If the Guide Shoe lowers on the 'un-cut' turf, when the Auto-Steer is switched '**ON**', switch the Auto-Steer '**OFF**'. The re-set cylinder will move the Guide Shoe 'off ' the un-cut turf, then switch the Auto-Steer back '**ON**'.

- Proceed to cut the second strip.
- Lower the Cutter Head.
- Continue cutting the second strip, using the 'Fine Adjust' Control '**C**', to trim any waste. Each revolution of the Control Knob equals approximately ¼ inch of lateral movement of the Guide Shoe.

If the Auto-Steer works satisfactory but the 'Fine Adjust' Control Cable has run out of adjustment, re-set the cable.



NOTE

If there is a problem with the Auto-Steer during harvesting, re-set the Auto-Steer in the following sequence

Cam Roller and Roller Arm Position.

IMPORTANT

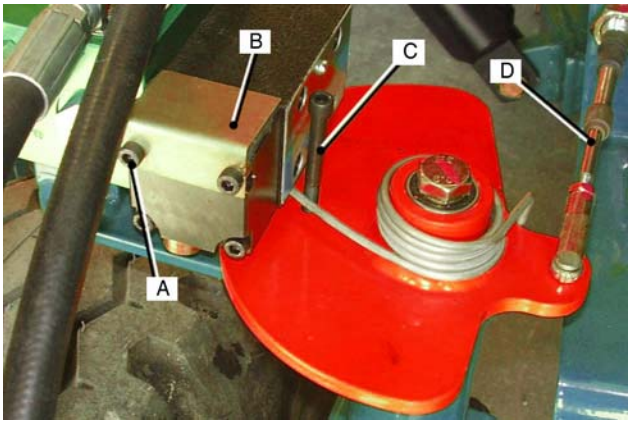
The Cam, Roller and Stop Pin **must be set-up** with the Stop Pin at the '**mid-point** ,' of its travel in the cavity, in the Sensor Valve End Plate. This is the 'NEUTRAL' position in the Sensor Valve.

Continued on the following page.

Cam and Roller Arm Set-Up.
The recommended method of setting the Auto-Steer is:

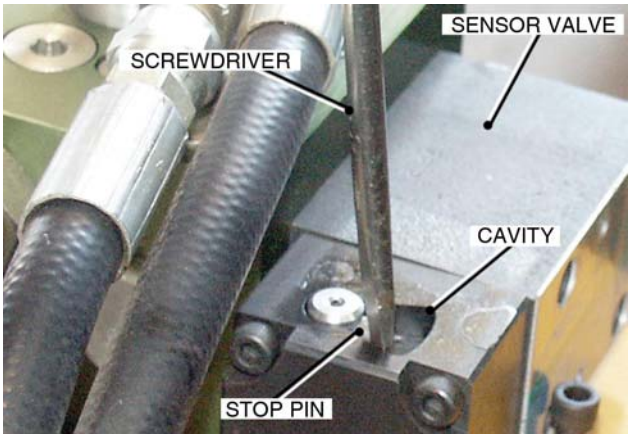
- Position the Harvester 'ready to cut'.
- With the Auto-Steer '**OFF**', cut a strip of turf, for a minimum distance of 20 feet. **It must be cut straight.**
- Stop the harvester.

The harvester will be parallel to the cut edge, the steering wheels 'straight ahead', and the Cutter Head 'down'.
Switch the Auto-Steer 'ON'. Turn the Tractor 'OFF'.



- Remove the two 5x40mm Socket Head Screws '**A**', from the Sensor Valve End Plate and remove the End Plate Cover '**B**', complete with Rubber Seal.

- Swing the Auto-Steer Guide Shoe '**left or right'**, to align the ¼ inch hole in the Cam, with the hole in the Support Plate.
- Insert a ¼ inch Bolt '**C**', through the holes to lock the Cam in position.
- Adjust the Cable '**D**' (attached to the Cam), to the 'mid-point' of its stroke travel, and lock it in place.



- Back-off the Setscrew that clamps the Roller Arm to the Roller Shaft. See lower figure.
  Use a 'flat blade' screwdriver to turn the Stop Pin to its **'mid-point' of travel, in the cavity**. Hold the Stop Pin in this position.
- The Sensor Valve Internal Spool will now be in the '**NEUTRAL**' position.

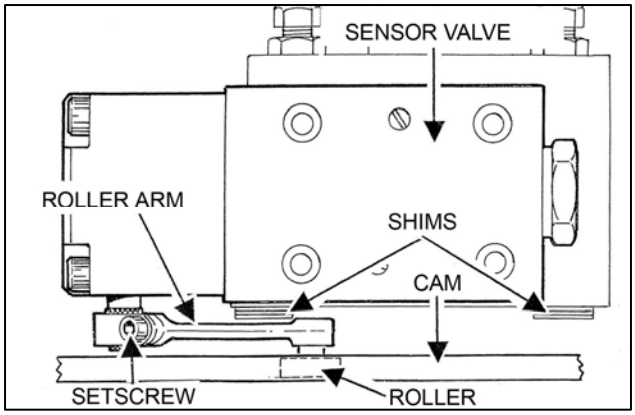
- Push the Roller Arm until the Roller is '**hard**' against the Cam.
- Adjust the Roller Arm 'up or down' on the shaft, to get maximum surface contact between the Roller and the Cam.
- Check that the Roller Arm is fully engaged on the knurled portion of the Roller Shaft.
- Tighten the Roller Arm Setscrew.

IMPORTANT

Before operating the Auto-Steer **remove the ¼ inch Bolt from the Cam**. Failure to do so will result in damage to the system.

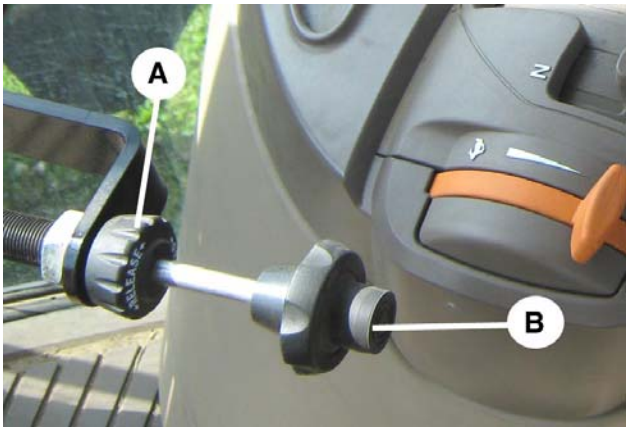
Also

Fill the Stop Pin Cavity with 'white grease' to prevent **corrosion forming on the Roller Shaft, causing it to 'stick' and adversely affecting the operation of the Auto-Steer**



- Position the Sensor Valve End Plate Cover, complete with the rubber seal, re-fit the 40mm Lg. Socket Head Screws.

Fine Adjust Control.
As noted on page 6-02, the Fine Adjust Control allows the operator to trim the waste strip. It is recommended that it is set-up as follows:



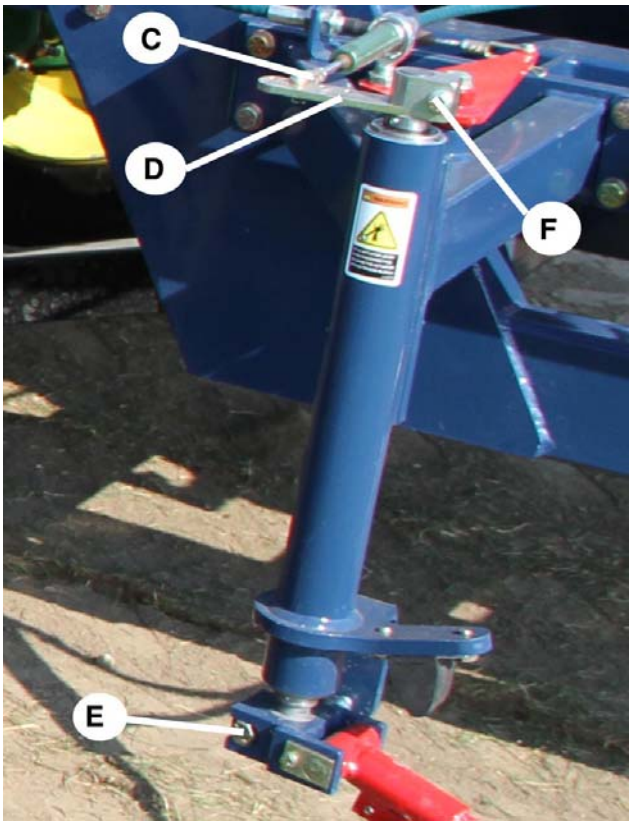
Set the Fine Adjust Control to its 'Mid-Point' by:

- Releasing the Control Lock '**A**'.
- Press the End Button '**B**', and slide the Control Knob '**IN'** or '**OUT**,' to find the mid-point of travel.
- Re-tighten the Control Lock.

Actuator Column.
Spring Tension Adjustment.

CAUTION

The Top Lever Arm is under spring tension.
Exercise care when removing the Cable Clevis End from the Top Lever Arm, or loosening the Lever Arm Clamp Bolt.



Position the Guide Shoe against the cut edge of turf :

- Remove Clevis End '**C**', from Top Lever Arm '**D**'.
- Loosen the Shoe Arm Clamp Bolt '**E**'.

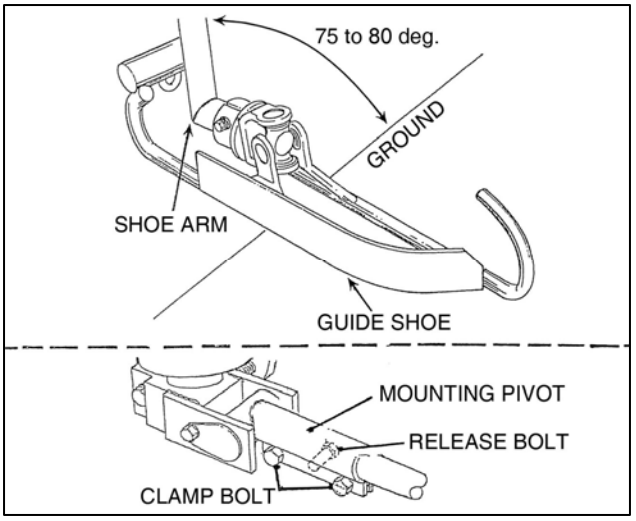
The Top Lever Arm '**D**', should rotate **'clockwise'** approximately **80 to 90 degrees**, releasing the spring tension.
If the Lever Arm rotates 'back' **less than 80 degrees,** re-set it by loosening the Clamp Bolt '**F**', and turning the Lever Arm the required **80 to 90 degrees.**

- Tighten the Clamp Bolt **'E**'.
- Fit a 1¼ in. wrench on the Lever Arm Boss and rotate the Top Lever Arm 'back' **80 to 90 degrees**, **against spring pressure**.
- Refit the Clevis End '**C**'.

Shoe Arm Adjustment.

The Guide Shoe Arm must be at a **75 to 80 degree** angle to the ground.
To adjust the Shoe Arm angle :
Loosen the two Clamp Bolts in the Mounting Pivot.

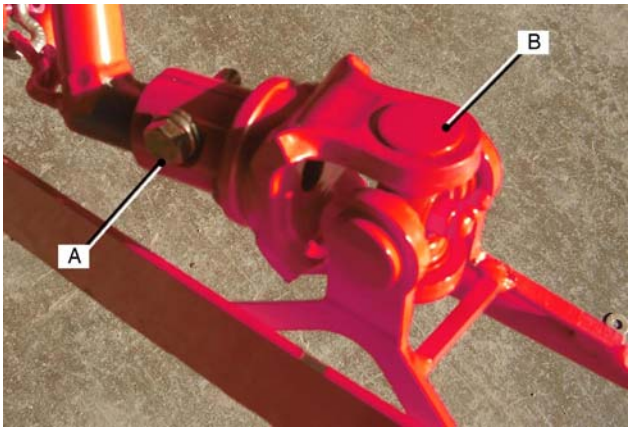
- Tighten the Release Bolt to 'open up' the clamp and rotate the Shoe Arm to the correct angle.
- Back-off the Release Bolt and tighten the Clamp Bolts.



Guide Shoe Adjustment.

The Guide Shoe must be correctly adjusted as follows :

- Loosen the Yoke Clamp Bolt '**A**', and rotate the Guide Shoe '**B**', until there is ¼ **inch** clearance between the **inside edge** of the shoe and the ground.
- Tighten the Yoke Clamp bolt.

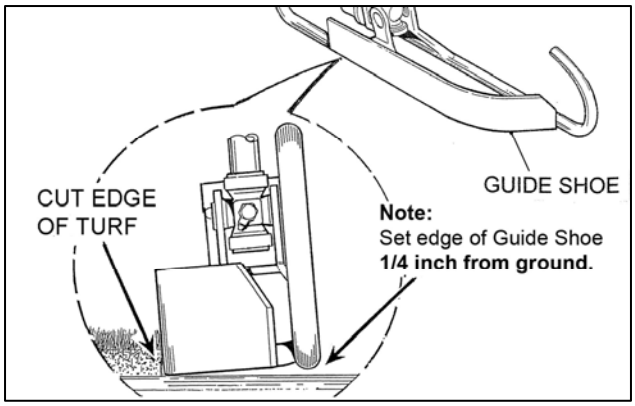


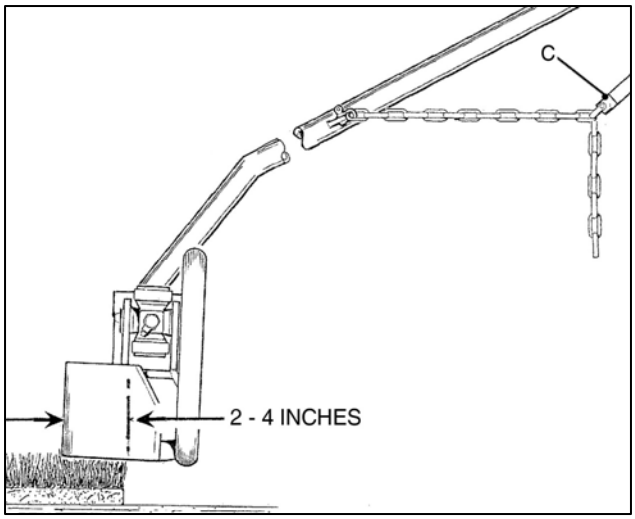
Re-Set Cylinder Chain Adjustment.

The Re-Set Cylinder '**C**', must be attached to the chain at a point that allows the Guide Shoe to travel no more than **2 to 4 inches past the 'cut edge'** onto the uncut turf.

IMPORTANT

The Reset Cylinder chain links must be adjusted before the adjustment to the Stop Bolt. See below.





STOP BOLT ADJUSTMENT.

The Stop Bolt '**D**', determines where the Guide Shoe will 'drop' on the **ground** when the Auto-Steer is activated. For most harvesting conditions the Stop Bolt is adjusted to position the Guide Shoe 1 to 2 inches away from the 'cut edge'

If the conditions require adjustment to the Guide Shoe : **'Away'** from the cut edge :

- Back-off the Locknut and turn the Stop Bolt '**IN**'.

'Closer' to the cut edge :

- Turn the Stop bolt '**OUT**'.

After adjustment **fully tighten the Locknut.**

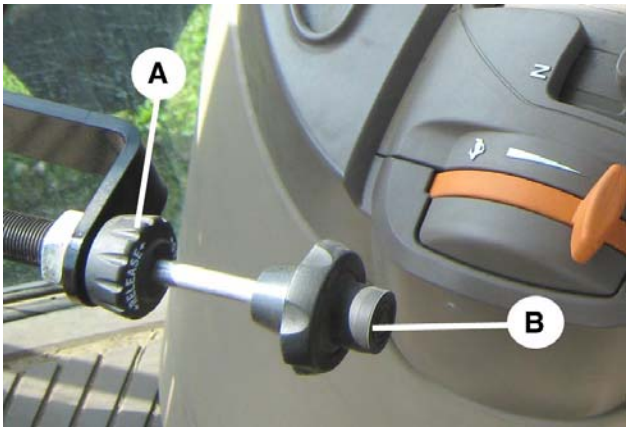
Tracking Adjustment.

The recommended method of setting the tracking is :

- Position the harvester 'ready to cut'.
- With the Auto-Steer switched '**OFF**,' cut a strip of turf, for a minimum distance of 20 feet, **it must be cut straight.**
- Stop the harvester.

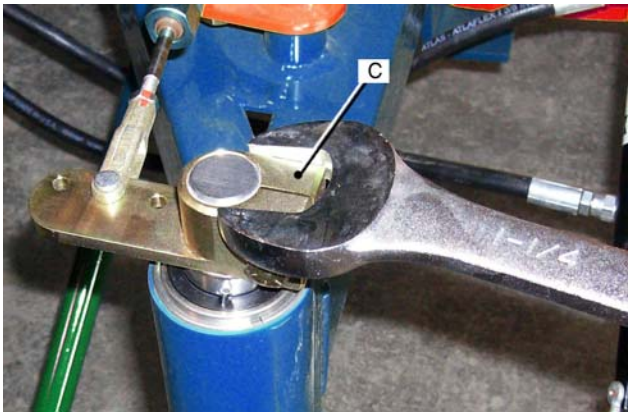
The harvester will be parallel to the cut edge, the steering wheels 'straight ahead', and the Cutter Head 'DOWN'.

- Switch the Auto-Steer '**ON**', the Guide Shoe will 'drop'.



To Set the Fine Adjust Control to '**Mid-Point**':

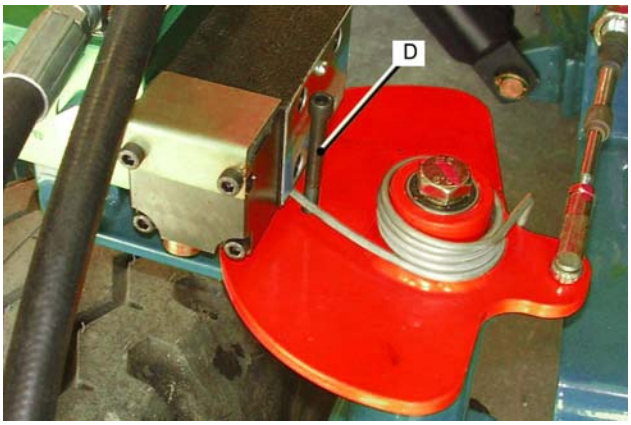
- Release the Fine Adjust Control 'lock' '**A**'.
- Press on the End Button '**B**', and slide the Control Knob Rod '**in or out'**, to find its mid-point of travel.
- Re-tighten the Control 'lock' '**A**'.



- Position the Guide Shoe against the 'cut edge' of turf.
- Fit a 1¼ in Wrench '**C**', on the Top Lever Arm.

- Use the wrench on the Lever Arm to rotate the Cam
- until the ¼ inch hole in the Cam aligns with the hole in the Support Plate.
- Insert a ¼ in. Bolt '**D**', in the holes to lock the Cam in place.

The Sensor Valve will now be in the '**NEUTRAL**' position.



To prevent **any movement** of the Top Lever Arm and Spring Column Shaft, use the wrench to hold the Top Lever Arm firmly, against spring pressure and :

- Loosen the Shoe Arm Clamp Bolt '**E**', and move the Guide Shoe against the 'cut edge' of the turf.
- Tighten the Shoe Arm Clamp Bolt.

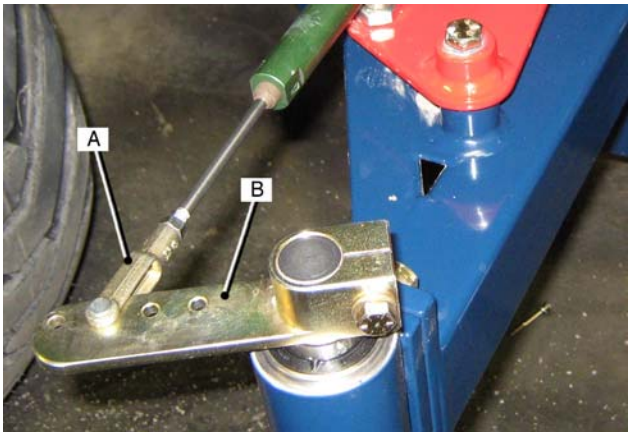
IMPORTANT

Before operating the Auto-Steer the ¼ in. bolt **must be removed** from the Cam. Failure to do so will result in damage to the Auto-Steer mechanism.

Sensitivity Adjustment

CAUTION

The Top Lever Arm is under spring tension.
Exercise care when removing the Cable Clevis End from the Top lever Arm, or when loosening the Lever Arm Clamp Bolt.



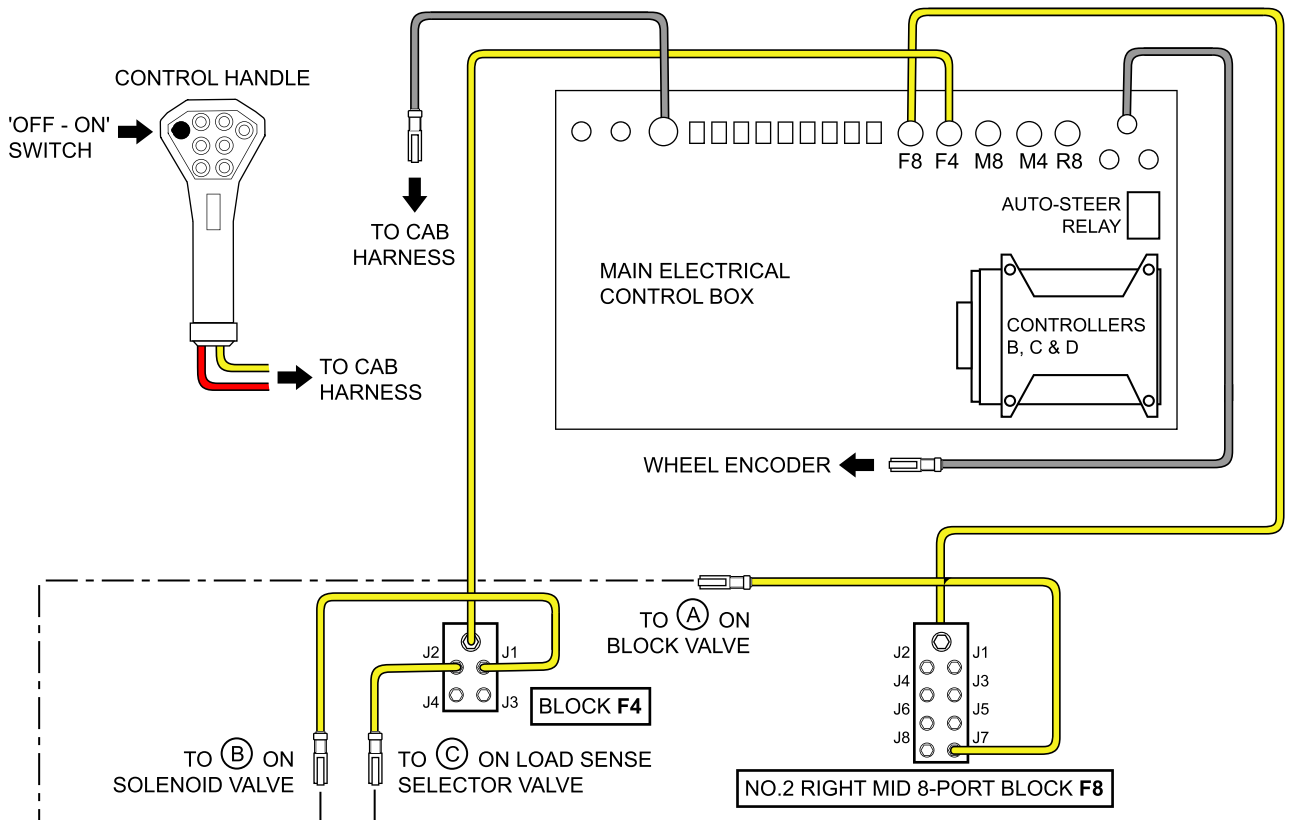
On initial set-up the Cable End '**A**', from the Sensitivity Valve may be attached at the second outer hole in the Top Lever Arm '**B**'.

- To '**increase**' sensitivity, re-position the Rod End Clevis in the '**outer**' hole in the Lever Arm.

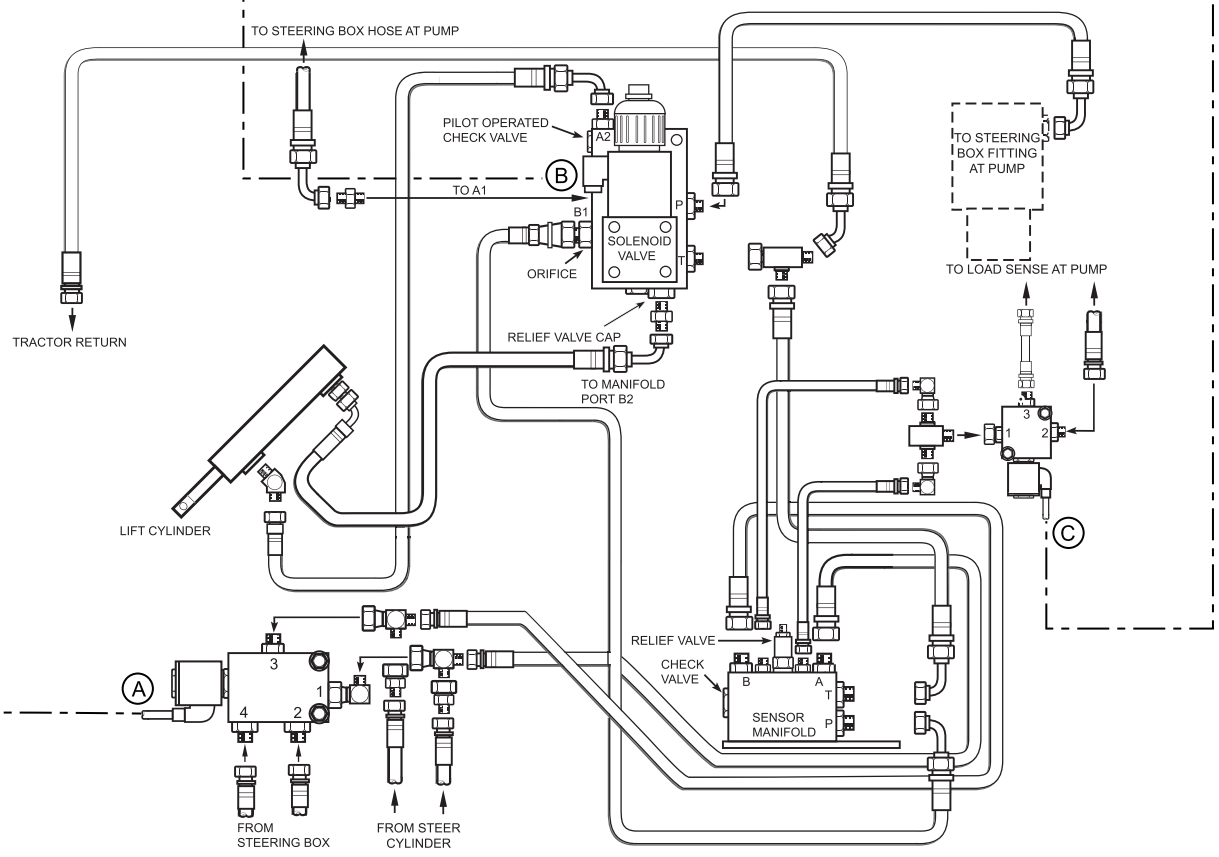
- To '**decrease**' sensitivity, re-position the Rod End Clevis at the second '**inner**' hole in the Lever Arm.

Auto-Steer Electrical System

Serial No. 164 onwards


CONTROL HANDLE
'OFF - ON' SWITCH
TO CAB HARNESS
TO CAB HARNESS
F8 F4 M8 M4 R8
AUTO-STEER RELAY
MAIN ELECTRICAL CONTROL BOX
CONTROLLERS B, C & D
WHEEL ENCODER
TO Ⓐ ON BLOCK VALVE
J2 J1 J4 J3
BLOCK F4
J2 J1 J4 J3 J6 J5 J8 J7
TO Ⓑ ON SOLENOID VALVE
TO Ⓒ ON LOAD SENSE SELECTOR VALVE
NO.2 RIGHT MID 8-PORT BLOCK F8

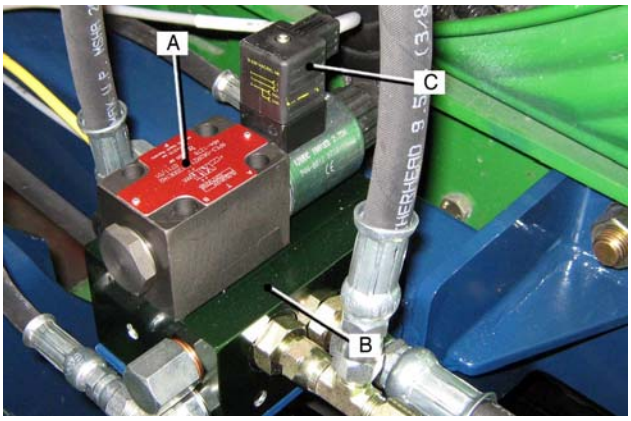
Auto-Steer Hydraulic System



Main Solenoid Valve.

The Main Solenoid '**A**', is mounted on a Manifold '**B**', that controls the oil flow from the tractor power steering to the Auto-Steer system.
The Manifold and Solenoid Valve are located to the left of the engine and are easily accessible.
The Solenoid DIN Connector '**C**', feeds power to the Solenoid.

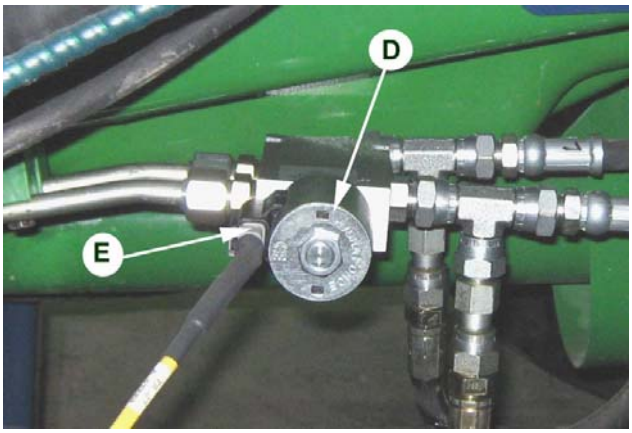
See page 6-09 for operation check.



Auto-Steer 'ON-OFF' Solenoid.

The Auto-Steer 'ON-OFF' Solenoid '**D**', is located on the right hand side of the tractor, below and forward of the right side door.
The DIN Connector '**E**', feeds the power.

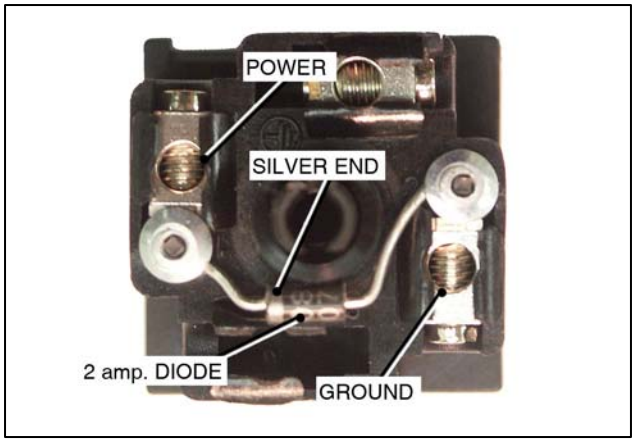
See page 6-09 for service check.



DIN Connector.
Solenoid DIN Connectors are fitted with a 2 amp Diode.
If the Diode fails current can still flow to the Solenoid, but 'current reversal' may damage the, 'ON -OFF' Switch in the Control Handle.
It is recommended that a new DIN Connector is fitted if the Solenoid is replaced.

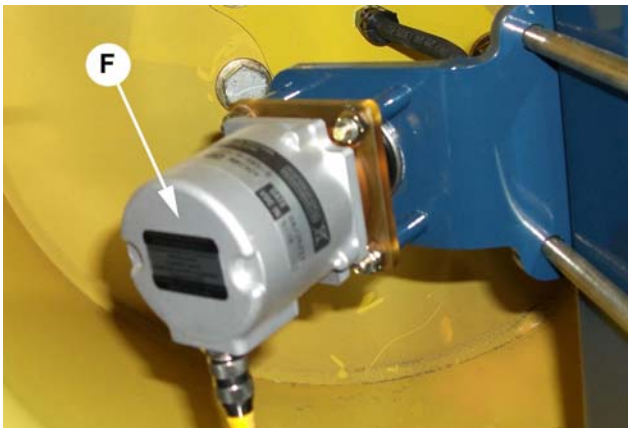
IMPORTANT

The 'Power Feed' to the Diode **must be connected** to the **SILVER** end of the Diode.

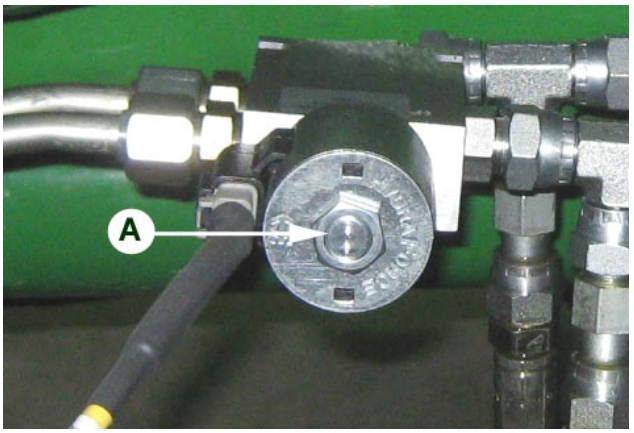


Wheel Encoder.

The Wheel Encoder '**F**', (for Cut-Off Length),is also connected to the Auto-Steer through Controller C2. See page 6-07.
If the ground speed exceeds 1.5 mph.(2.4 kph), the Auto-Steer will disengage.
To re-engage the Auto-Steer, reduce the ground speed to less than 1.5 mph, and switch the Auto-Steer '**OFF**' and then '**ON**', with the toggle switch on the Control Handle.

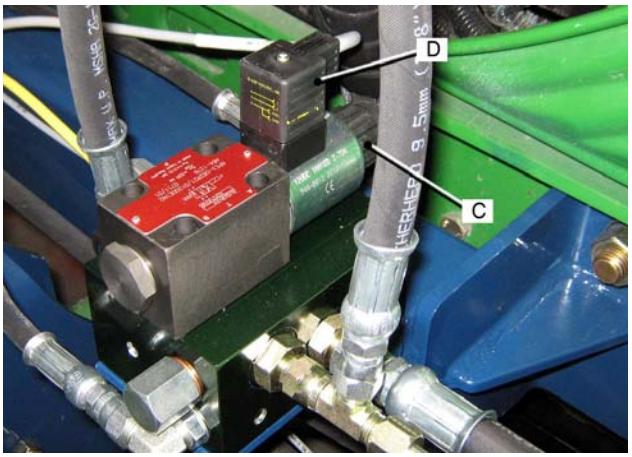


If the Auto-Steer malfunctions after the set-up instructions in pages 6-01 to 6-06 have been followed, the electrical and hydraulic systems must be checked for faulty circuits or components.



Electrical Circuit. Solenoid Valves.
Auto-Steer 'ON-OFF' Solenoid Valve.

- Back-off the Locknut '**A**' on top of the '**ON-OFF**' Solenoid.
- Switch the ignition to '**Accessories**'.
- Switch the Auto-Steer to '**ON**', with the Switch '**B**' on the Control Handle, **at the same time** observe if the Solenoid operates, (evident by a 'CLICK' and movement of the cover, also, the cover will be magnetized).If there is no response check that there is power to the Solenoid DIN Connector. If there is power, install a new Solenoid.



NOTE

When the Solenoid has been removed, the Valve Cartridge should be checked. See following page.

Main Solenoid.

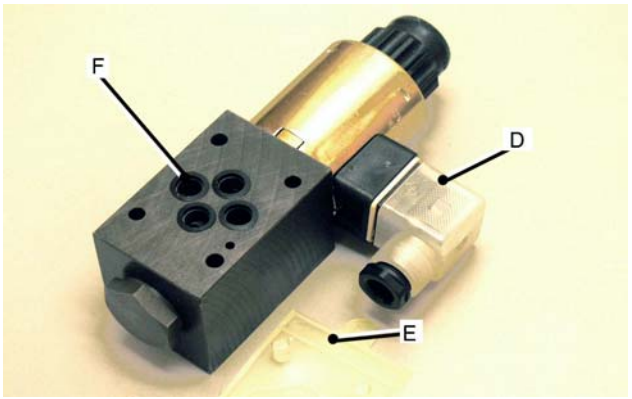
- Press the Solenoid Plunger '**IN**', at arrow '**C**', and operate the Auto-Steer '**ON-OFF**' Toggle Switch '**B**' on the Control Handle.
  The Plunger should move '**IN** and **OUT**'.

If the Solenoid Plunger does not move, check that power is getting to the DIN Connector '**D**'.

If circuit checks indicate that there is power from the Toggle Switch to the DIN Connector, the Solenoid Valve is faulty.

To replace the Solenoid Valve :

- Unplug the DIN Connector, '**D**'.
- Take out the four Socket Head Bolts and remove the Solenoid Valve.
- New Solenoid Valves have a Protective Cove '**E**' on the working face.
- Check that the Face Seals '**F**', are in place when the cover is removed, and the valve face is clean, before fitting the Valve to the Manifold.



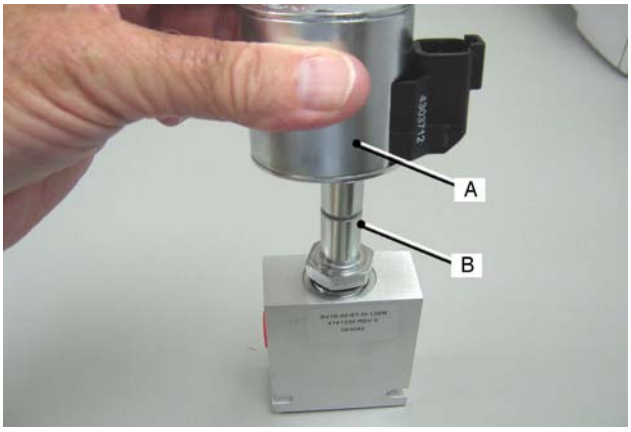
If the Auto-Steer fails to function properly, after the above checks have been carried out, see the following pages for further checks and adjustments that may be necessary.

Installing New 'ON–OFF' SOLENOID BODY.

IMPORTANT

Thoroughly clean around the area to be worked on.
Do not allow any dirt or foreign matter to enter the Solenoid Valve.

- Switch the Auto-Steer and Main System Power on the Cab Control Panel to '**OFF**'.
- Remove DIN Connector and the Locknut, as shown on page 6-09.
- Lift the Solenoid Body '**A**' off the Cartridge Stem '**B**'.
- Install the new Solenoid Body.
- Refit the Locknut and the DIN Connector.



NOTE

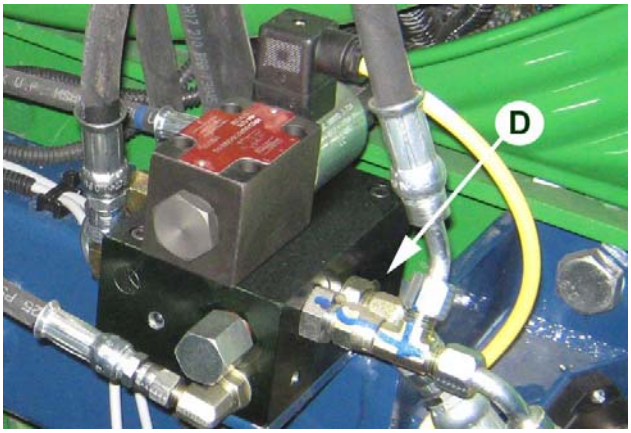
With the Solenoid removed from the Valve, the Valve Cartridge should be checked, as follows.

- Remove the Cartridge '**C**', from the Valve Body. Care must be taken when handling the Cartridge to ensure that the O-Rings are not damaged.
- **Thoroughly clean** the Cartridge Assembly. If there is any sign of damage, install a new Cartridge.
- Lightly oil the assembly before installation.
- Refit the Solenoid and DIN Connector.

Main Solenoid Manifold.

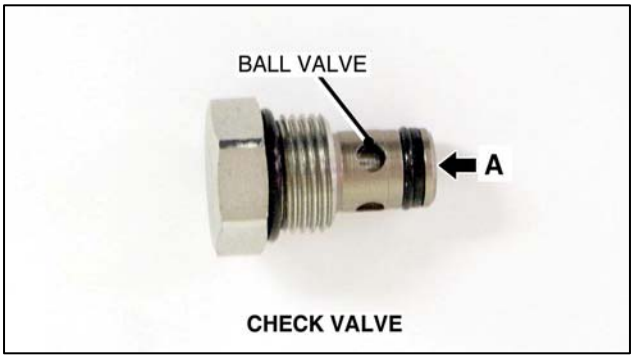
If the Guide Shoe will not stay in the 'raised' position when operating in 'Manual Mode', verify that the 'Check Valve' in the Manifold is not 'sticking'.

- Remove the Check Valve '**D**', from the Manifold.
- Thoroughly wash and clean the Valve. Inspect it and carefully remove any particles of dirt that may cause the Ball Valve to stick.
- The Ball must move freely when lightly pushed 'IN and OUT' at Arrow '**A**'.
  If it does not move freely, and persists in sticking, install a new Check Valve. (Part No.KH20042).



NOTE

Pilot Piston.
With the Check Valve removed from the Manifold, check that the Pilot Piston, inside the Manifold, slides freely in its bore. This procedure is the same as on the Sensor Valve, and is shown on the following page.



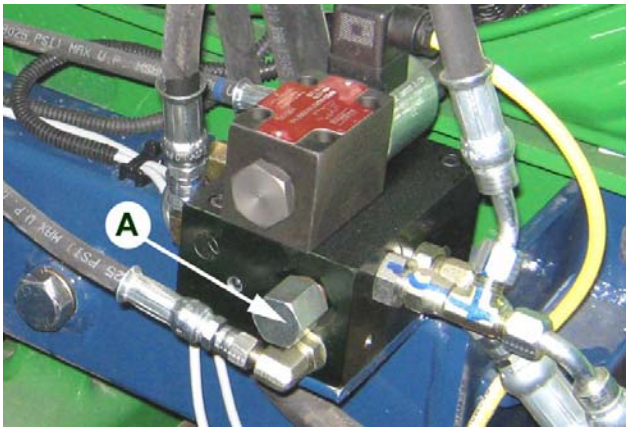
Main Solenoid Manifold.

Relief Valve.

If the steering feels 'Sluggish' when in the 'Manual Steer' Mode, the Relief Valve Adjuster may need re-setting as follows.

- Remove the Relief Valve Cap '**A**'.
- Check that the Relief Valve Adjuster '**B**', is screwed completely '**IN**', **tightly**.
- Replace the Relief Valve Cap.

For clarity the Relief Valve Assembly is shown removed from the Manifold.



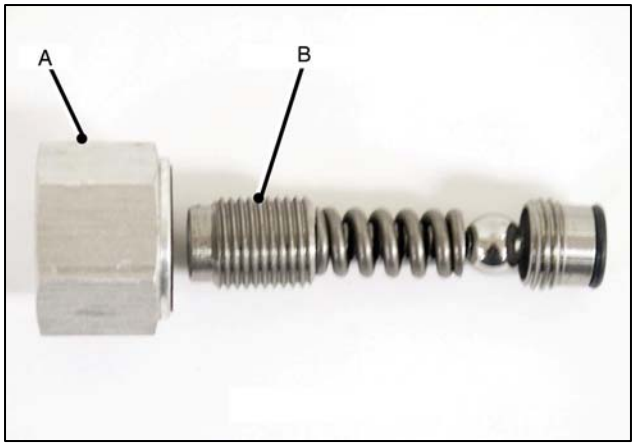
Sensor Manifold. Pressure Check.

If the Auto-Steer feels 'sluggish' and lacks 'sensitivity', check the oil pressure at Pressure Port '**P**' and Return Port '**T**' as follows :

- With the engine switched '**OFF**'.
- Remove the Hoses to Pressure Port '**P,**' and Return Port '**T**'.
- Fit pressure gauges, with Tee fittings, to each Port, and connect the hoses to the gauges.
- Start the engine and run at 1500rpm.

Cold oil pressure at Port '**P**' should read 1000 to 1100 psi.
- at Port '**T**' should read 300 to 400 psi.

This reading is a guide, and may need adjustment to obtain optimum Auto-Steer performance.
If excessively high pressure is indicated at the Return Port, check the return line for possible blockage.



Pressure Adjustment.

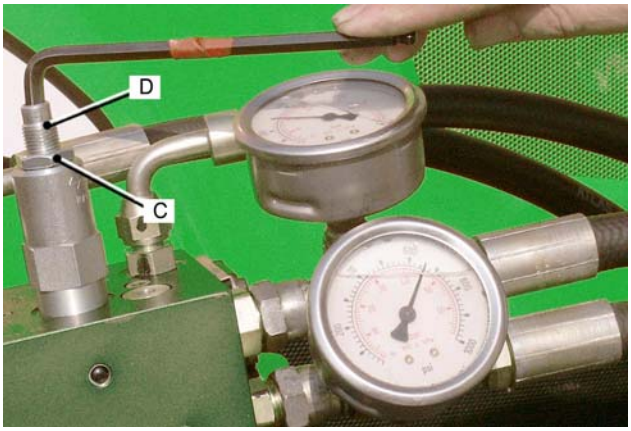
To **increase** the pressure at Port '**T**':

- Back-off the Jam Nut '**C**', on the Relief Adjuster '**D**', and turn the Adjuster '**IN**'

To **reduce** pressure at Port '**T**':

- Turn the Adjuster '**OUT**'.

Tighten the Jam Nut after adjustment is made.
If pressure cannot be adjusted satisfactorily the Relief Valve is faulty and must be replaced. (Part No. KH20036).

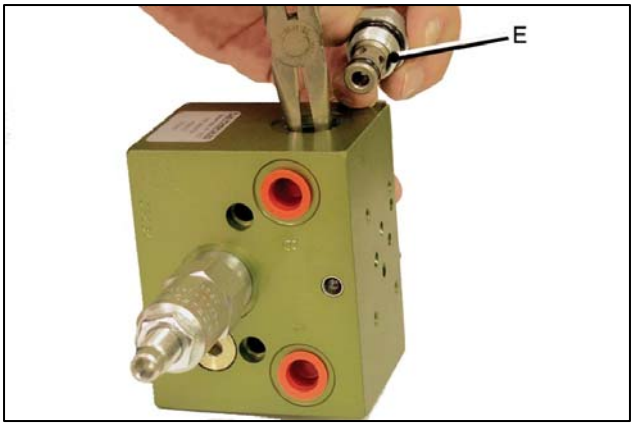


At this time both Manifold Check Valves '**E**', should be removed and checked, as shown on page 6-09.
Replacement Check Valves are Part No. KH20056.

Pilot Pistons.
With the Check Valves '**E**', removed, verify that the Pilot Pistons slide freely in there boress. Use Needle Nose Pliers to '**gently**' grip the Piston and move it in the bore.

It is important that no dirt is allowed to enter the Manifold when checking the Valves and Pilot Pistons.

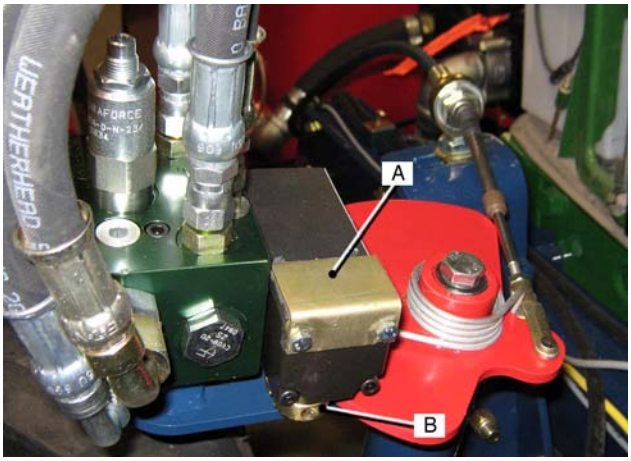
For clarity the Manifold is shown 'on the bench', and only one Check Valve is shown.



Sensor Valve.

If the Auto-Steer operation is 'erratic' and the Guide Shoe will not stay on track, the Cam Roller Shaft may be sticking in the End Cap.

To prevent dirt and corrosion from forming on the shaft and affecting the operation, a Cover '**A**', with a foam seal is fitted to the Valve End Cap, over the Cam Roller Shaft '**B**', It is still possible, because of pressure washing and long periods of storage, that the Sensor Valve End Cap Assembly may need to be replaced.

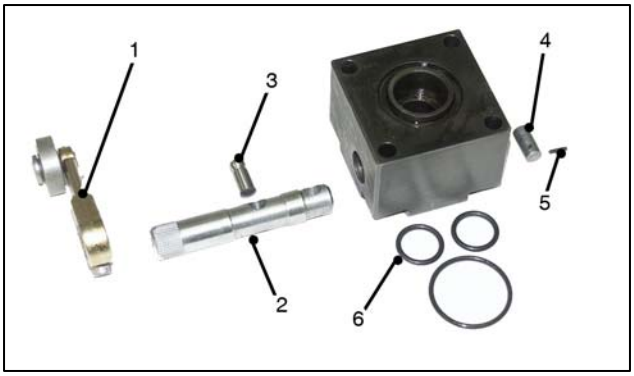


NOTE

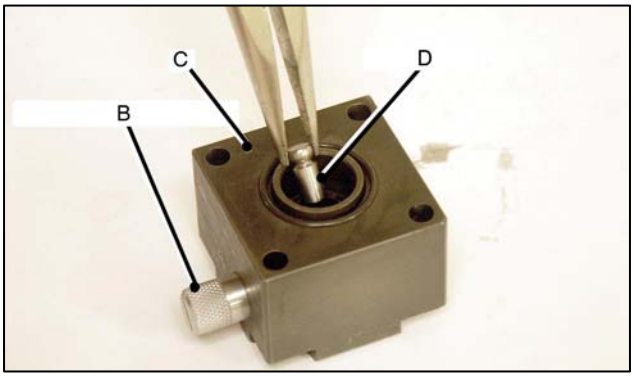
For ease of servicing it is recommended that the Sensor Valve Assembly should be removed from the Manifold. Smear clean oil on the components before assembly.

IMPORTANT

When carrying out the following procedure, **the work area, your hands, and tools must be CLEAN,** to eliminate the possibility of any dust or dirt getting into the End Cap or Sensor Valve mechanism .

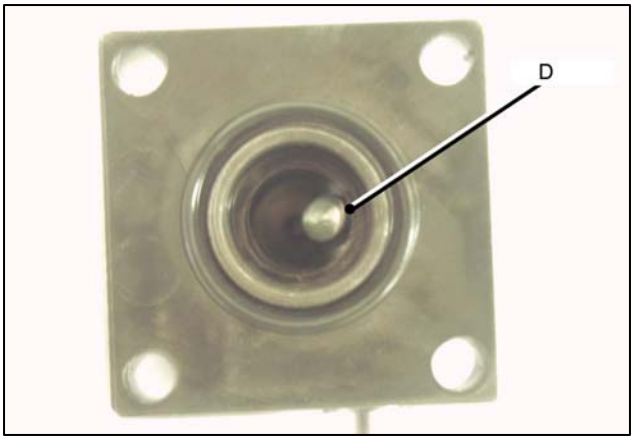


End Cap Service Kit. Part No. KH20054 contains :
1.Cam Roller Arm ; 2.Cam Roller Shaft ; 3.Ball Pin ; 4.Stop Pin ; 5.Spring Pin ; 6.Three O-Rings.
The two small O-Rings fit inside the End Cap, to seal the Cam Roller Shaft bore
The large O-Ring fits in the recess in the End Cap, as a seal between the End Cap and the Sensor Valve Body.



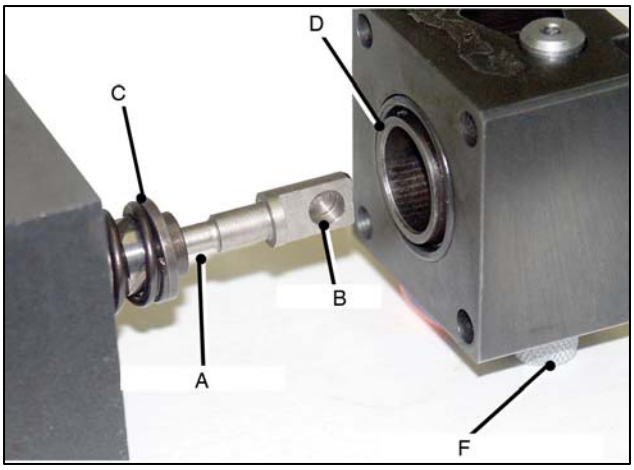
Insert the Cam Roller Shaft '**B**', into the End Cap '**C**'. Use suitable pliers to carefully fit the Ball Pin '**D**', into the hole in the Shaft. The Pin is a 'slide fit' in the shaft.

Position the Ball '**D**', to the right and center of the bore.
The Ball must be pushed fully into the shaft to allow the end of the Valve Spool to pass over it and allow the Ball to slide into the recess.



Sensor valve

Carefully pull the Valve Spool '**A**', a little way out of the Sensor Valve, with the Recess '**B**', positioned as shown.



Check that the Spring Seat '**C**', on the Spool Shaft, and the O-Ring '**D**', in the End Cap, remain in position.

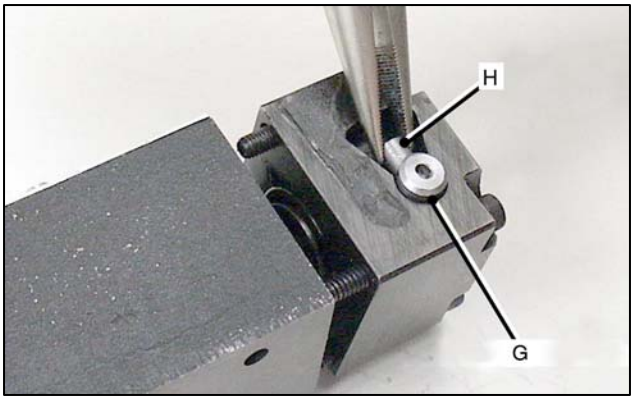
NOTE

The Spring Seat **must** be fitted with the **flat end** against the Spring, the **raised portion** toward the End Cap.

Carefully insert the end of the Valve Spool into the End Cap, until the Ball Pin is felt to be located in the Recess in the Valve Spool Shaft.
When the Ball is located in the Recess, rotate the Cam Roller Shaft '**F**', at the **knurled end** '**clockwise**', this will fully locate the Ball in the recess in the Valve Spool, and also pull the End Cap toward the Sensor Valve Body.

NOTE

The above procedure requires care, and 'light touch,' to ensure that the Ball seats fully into the recess.

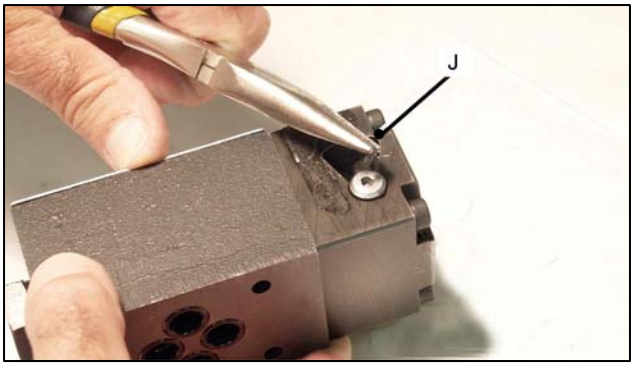


Attach the End Cap to the Valve body using the two 35mm Long Socket Head Screws '**G**'. These screws are fitted in the End Cap **closest** to the knurled end of the Roller Shaft.

Rotate the Roller Shaft '**F**', until the hole for the Stop Pin is in line with the center of the cavity, and fit the Stop Pin '**H**', with the small hole, for the Spring Pin, aligned with the hole in the top of the Roller Shaft.

NOTE

If the Roller Shaft is **turned too far to the right**, before the Stop Pin is fitted, the Ball will come out of the recess in the Spool Shaft, the above procedure must then be repeated.

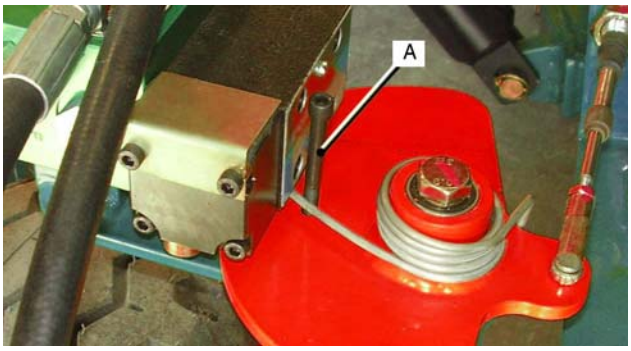


Tap the Spring Pin '**J**', into the end of the Cam Roller Shaft to secure the Stop Pin

Fit the Cam Roller Arm loosely on the Roller Shaft, with the Roller positioned in the 'center' of the Sensor Valve Body. Thoroughly clean the faces of the Sensor Valve and the Manifold, check that the Face Seals are in place, and bolt the Sensor Valve/End Cap Assembly to the Manifold.

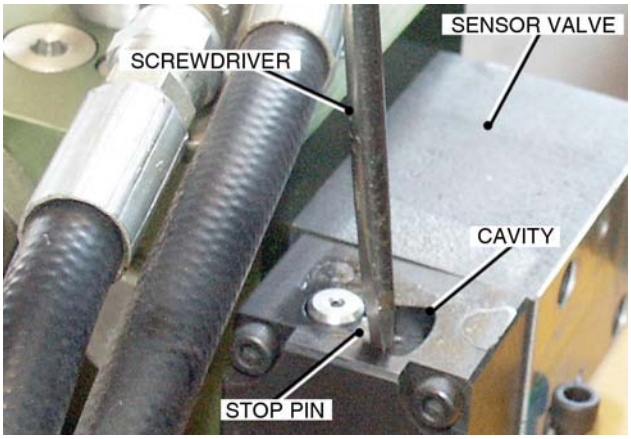
Sensor Valve.
Cam and Roller Lever Set-up

It is important that the Cam, Roller Arm and Stop Pin are set-up as follows to ensure the that the Cam Roller Shaft is at the midpoint of travel, corresponding to the '**NEUTRAL**' position of the Sensor Valve.



- Manually rotate the Auto-Steer Guide Shoe, to the left or right, until the ¼ inch hole in the Cam lines up with the hole in the Sensor Valve Support Plate.
- Insert a ¼ inch Bolt '**A**', through the holes to lock the Cam in place.
- Use a flat Screw Driver to rotate the Stop Pin until it is at its '**midpoint**' of travel in the Cavity.

This will position the Sensor Valve Spool in the '**NEUTRAL**' position in the Valve Body.

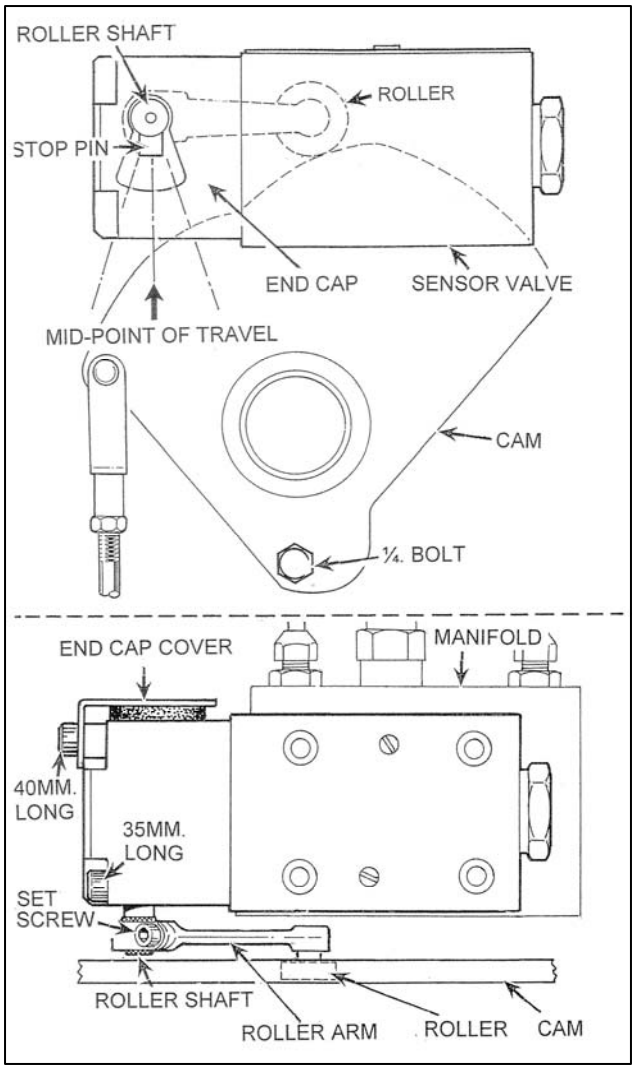


- Push the Roller Arm, until the Roller is '**hard**' against the Cam.
- Check the position of the Cam Roller on the Cam face.
- Position the Roller Arm, on the Cam Roller Shaft, until there is maximum surface contact between the Roller and the Cam, while maintaining full engagement of the Roller Arm on the **knurled portion** of the Cam Roller Shaft.
- Tighten the Socket Head Screw clamping the Roller Arm to the Cam Roller Shaft.

IMPORTANT

Remove the ¼ inch Bolt, from the Cam, failure to do so will result in damage to the Auto-Steer mechanism.

Fill the cavity around the Stop Pin with white grease.
Put the Top Cover, complete with rubber seal, in place and fit the two 40 mm.long Socket Head Screws.



Actuator Spring Column

The Auto-Steer components do not require special instructions for service or repair, with the exception of the Spring Column Assembly.
Regular servicing and cleaning contribute to the extended service life of the Auto-Steer System.

A broken or 'seized' Actuator Spring, inside the Column Tube, or 'seized' Shaft Bearings, will cause the Auto-Steer to operate erratically.
Corrosion on the Shaft, Spring, and Bearings can make it difficult to dismantle the parts.
For easy servicing of the Spring Column Assembly follow the instructions below.

Dismantling the Spring Column.

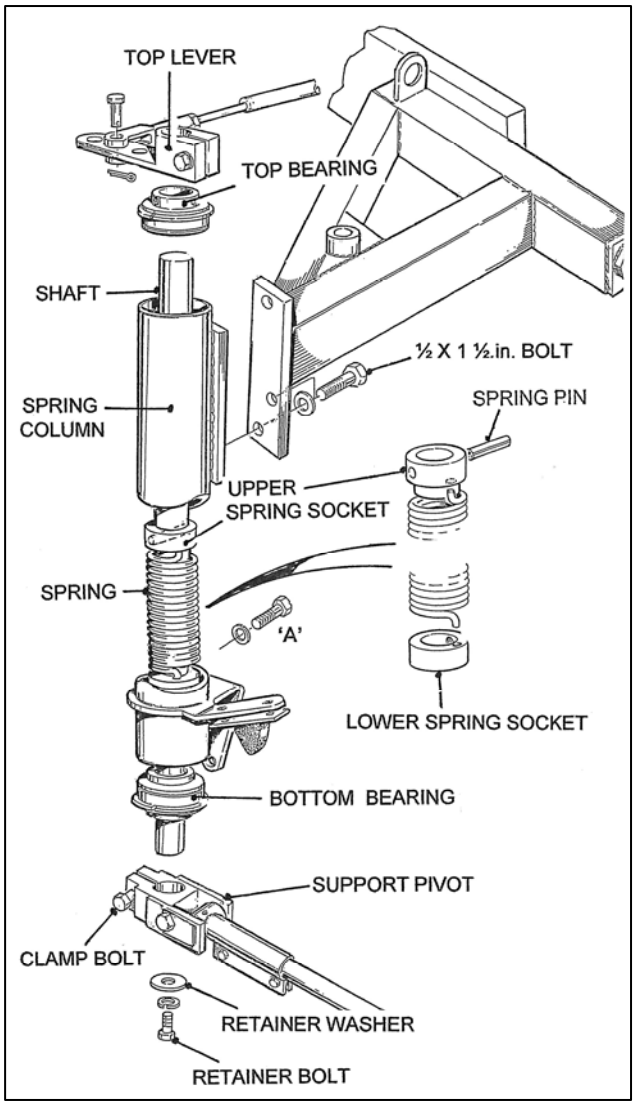
Lower the Auto-Steer Guide Shoe to the ground and switch the tractor engine **'OFF'**.

- Release the Clamp Bolt and remove the Top Lever Arm from the Shaft, complete with the Cable,
- Remove the Support Pivot Retainer Bolt and Washer.
- Back-off the Support Pivot Clamp Bolt and remove the Support Pivot and Shoe Arm from the Shaft.

It is easier to work on the Column Assembly if placed on a work bench :

- Remove three ½ x 1 1/2 in. Bolts, attaching the Spring Column Assembly to the Mount, and clamp it in a bench vise.
- Remove the Lower Spring Socket Retainer Bolt **'A'**.
- Back-off the Top Bearing Set-screws, and with a suitable 'drift' knock the Shaft, Spring, Lower Spring Socket and Bottom Bearing out of the Tube.
- Back-off the Bottom Bearing Set-screws and remove it from the Shaft.
- Remove the Spring, complete with Lower Spring Socket, from the Shaft.
- Insert the Shaft through the Tube and into the Top Bearing.
- Tighten the Bearing Set Screws and knock the Bearing out of the Tube.

See the following page for the re-assembly procedure.



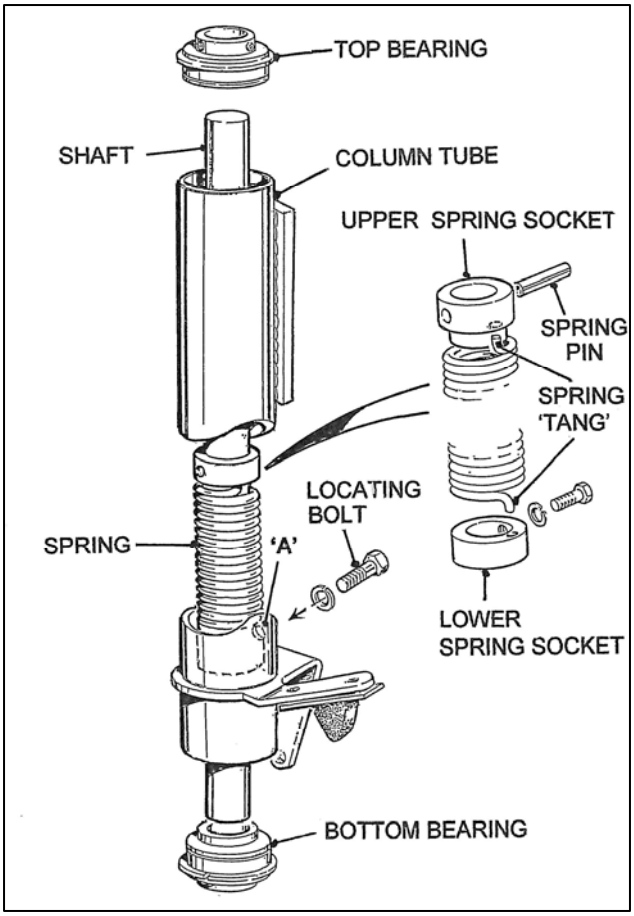
Actuator Spring Column –Reassembly.

Inspect the Shaft, Spring and Bearings, to ensure that they are in serviceable condition. Replace as necessary. Coat the Spring, Shaft, Upper and Lower Spring Sockets, and Bearings with grease before assembly.

- Slide the Spring, complete with Lower Spring Socket, onto the Shaft, and insert the Spring 'tang' into the Upper Spring Socket.

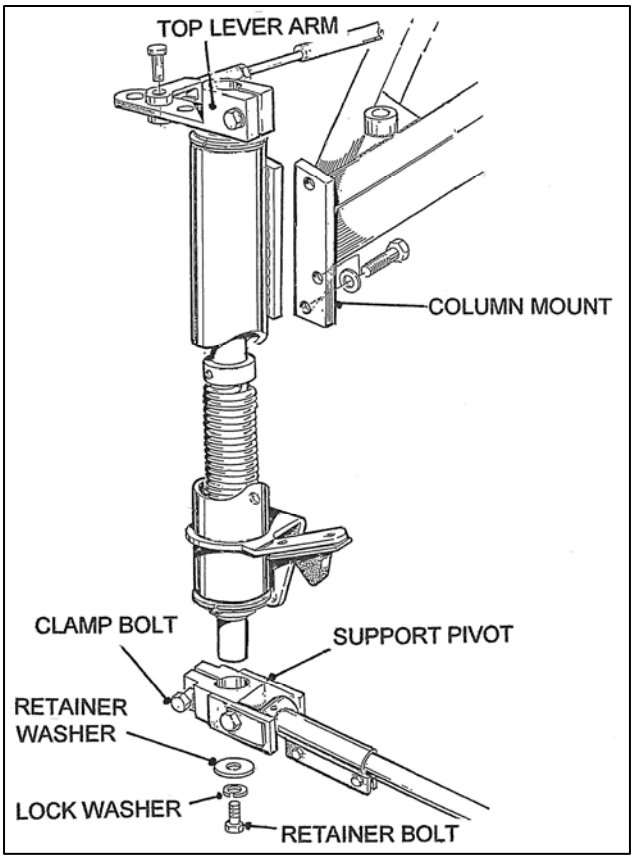
IMPORTANT

Install the Lower Spring Socket with the 'threaded' hole to the **'top'**. It must align with the Hole **'A'** in the Column Tube.



- Insert the Shaft/Spring Assembly into the Column Tube.
- Rotate the Shaft and Spring, until the 'threaded' hole in the Lower Spring Socket is aligned with Hole **'A'** in the Tube.
- Insert the Locating Bolt through the Tube into the Lower Spring Socket, and tighten it.
- Fit the Top and Bottom Bearings onto the Shaft and, with a suitable tool, carefully 'tap' them into the Tube.
- Tighten the Bearings Set Screws.

- Bolt the Column Assembly onto the Column Mount and refit the Top Lever Arm and Cable.
- Slide the Support Pivot and Shoe Arm onto the Shaft, do not fully tighten the Clamp Bolt at this point
- Fit Retainer Washer, Lock-washer and Retainer Bolt into the bottom of the Shaft.



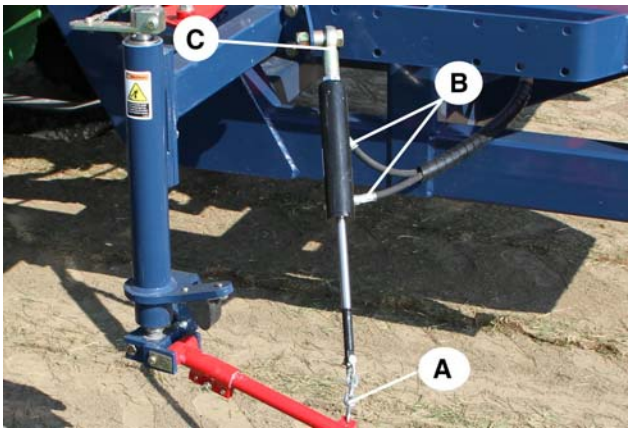
NOTE

The Support Pivot Clamp Bolt is not tightened until the set-up procedure is carried out. See pages 6-02 to 6-06

IMPORTANT

Before operating the Auto-Steer, after the repair or replacement of parts, refer to pages 6-02 to 6-06 for the correct set-up procedure.

Re-set Cylinder
If the Re-Set Cylinder is leaking oil, fit O-Ring Seal Kit Part No. KH70039, as follows :

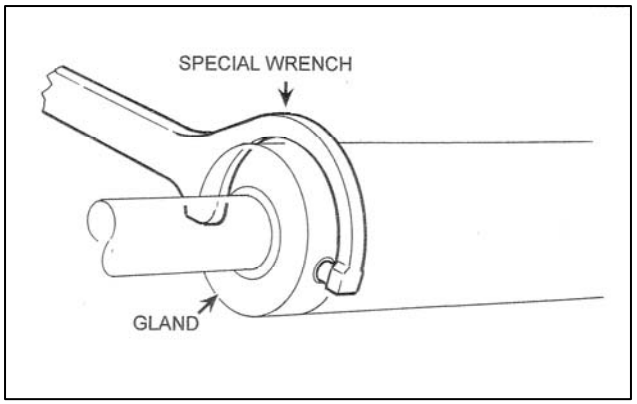


Switch the engine 'OFF'.

- Remove the Chain Shackle '**A**' from the Cylinder Rod.
- Disconnect the Hydraulic Hoses '**B**' from the Cylinder. Plug and cap the fittings.
- Remove the Nut and Bolt from the Ball End '**C**' and remove the Cylinder.

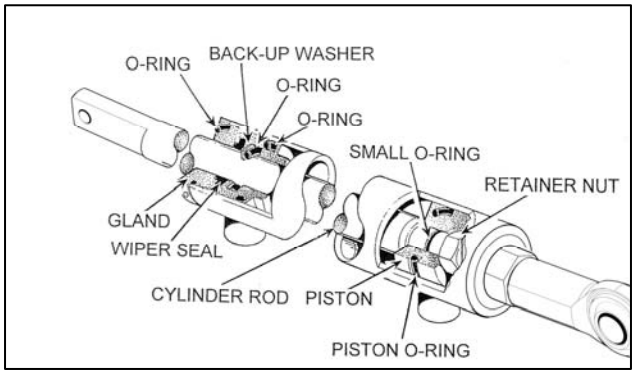
- Drain the oil from the cylinder.
- Place the Cylinder in a bench vise and unscrew the Gland using a Special Wrench
- Pull the Rod, Gland and Piston out of the Cylinder.

NOTE
Early Cylinders had a Snap Ring retaining the Gland. The Seal Kit contains parts for both types of cylinder.



IMPORTANT
Carefully note the location of the O-Rings, and the orientation of the Seals and Back-up Washers when removing them, to ensure the correct installation of new ones.
Smear the new O-Rings, Seals and Back-up Washers with clean oil before assembly.
Keep all components clean.

- Clamp the flat-end of the Cylinder Rod in a Vise and remove the Piston Retainer Nut.
- Pull the Piston and the Gland off the Cylinder Rod.
- Install the Wiper Seal, Back-up Washer and O-Ring inside the Gland and slide it, from the piston end, onto the Cylinder Rod.
- Fit the small O-Ring into the groove in the Cylinder Rod, and slide the Piston onto the Rod.
- Fit the Piston Retainer Nut.
- Fit the outer O-Ring under the head of the Gland and the inner O-Ring into the groove in the Gland.
- Fit the Piston O-Ring.
- Insert the Piston into the Cylinder and fill the Cylinder with oil.
- Screw the Gland into the Cylinder and tighten it using the Special Wrench.(or fit Snap Ring, see note above).
- Re-attach the Cylinder to the Harvester in reverse order of removal.



Section 7

NOTE

This section shows the changes required when the optional Double Sided Pallet Injector is installed.

PVG Control Valves.	7-01
Tractor Hydraulic Ports.	7-01
Hydraulic Schematic.	7-02
Control Valves. Electrical Connections.	7-03
Electrical Schematic. Sht.1.	7-04
Electrical Schematic. Sht. 2.	7-05
Electrical Schematic. Sht. 3.	7-06
Rear 8 Port Block. (R8).	7-07
Proximity Sensors.	7-07
Pallet Injector Pivot Bearings – Lube.	7-08

Hydraulic System.
PVG. Control Valves.

The Control Valves are located to the rear of the cab window. They can be manually operated with the window open.

IMPORTANT

Control Handles on the Control Valves are to be used **only when doing service work,** to enable functions to **be checked.** ***DO NOT use for harvesting operations.***

The Seven Bank Valves control :

1. Arm Rotate Cylinder.
2. Arm Lift Cylinder.
3. Arm Reach Cylinder.
4. Gripper Rotate Cylinder.
5. Multi Finger Grip Cylinder.
6. Single Grip Finger Grip Cylinder.
7. Squeeze Cylinders.

The 4 & 5 Bank Valves control:

1. Push Bar.
2. Pallet – 'DROP'.
3. Pallet – 'ROTATE'.
4. Pallet – 'LIFT'.

5. Index Conveyor
6. Eject Cylinder.
7. Gate.
8. Cut – Off Motor
9. Conveyor – 'ON'.

Single Control Valve.

10. Cutter Control Valve –No Control Handle.
    Located on the right hand side of the frame.

The following functions are powered from the Tractor Hydraulic System.

(See Hydraulic System Diagram).

- Port '**A**' Conveyor 'DOWN'.
- Port '**B**'. Conveyor 'UP'.

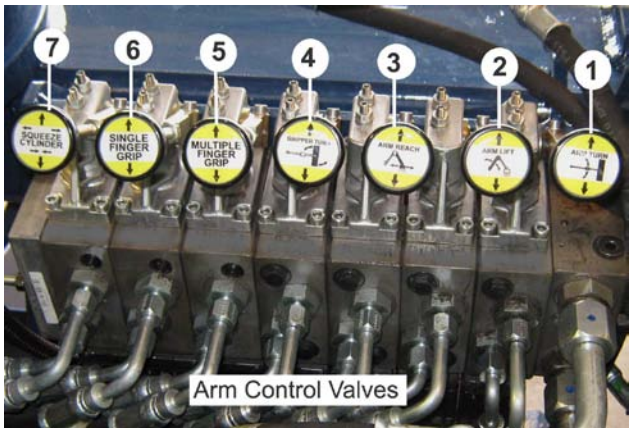
- Port '**C**' Retract Depth Cylinder. (Increase thickness).
- Port '**D**' Extend Depth Cylinder. (Decrease thickness).

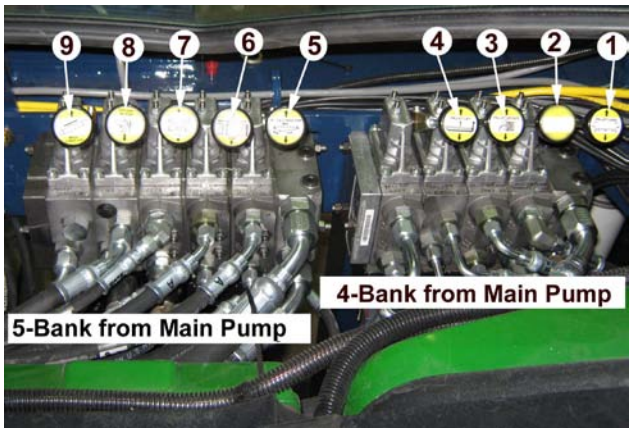
- Port '**E**'. Load Sense to Cutter Control Valve.

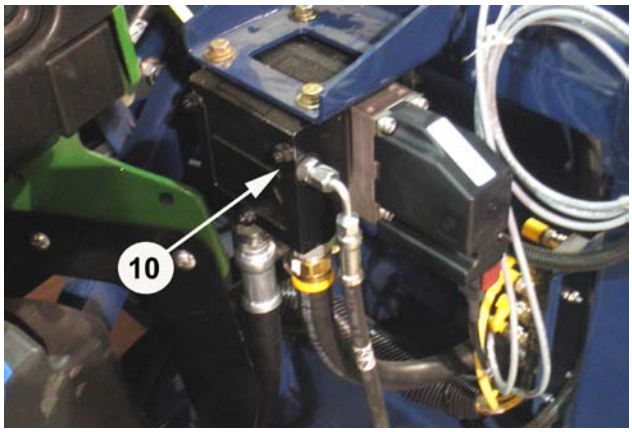
- Port '**F**'. Pressure to Cutter Control Valve.

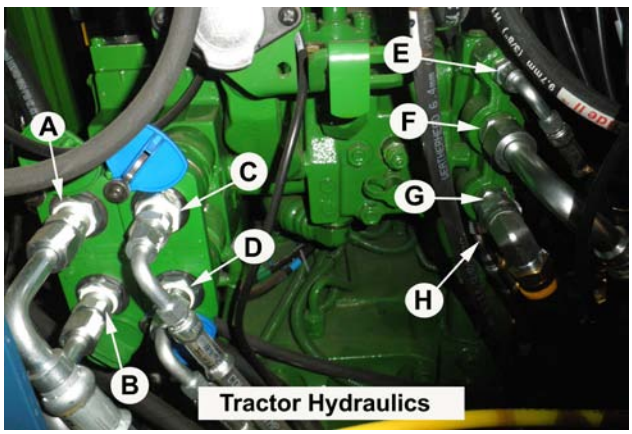
- Port '**G**'. Return from Cutter Control Valve.

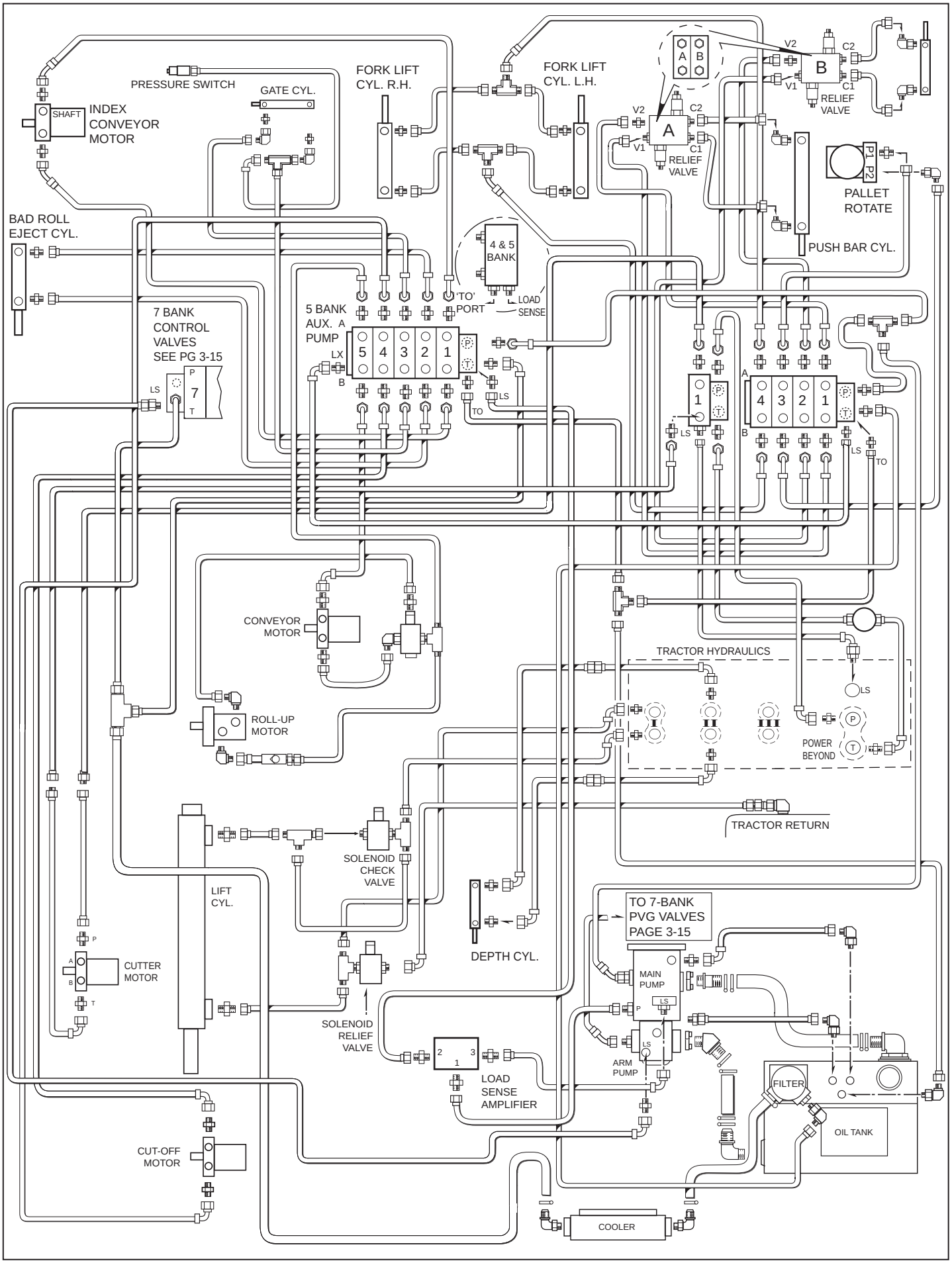
- Port '**H**'. Return from Lift Cylinder Solenoid Relief Valve.











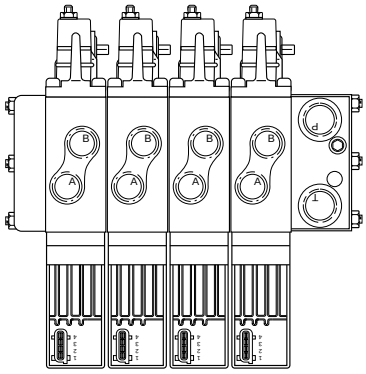
7-02

HYDRAULIC SCHEMATIC. ROBOMAX JD.
OPTIONAL DOUBLE SIDED PALLET INJECTOR - SERIAL NO. 179 AND UP.

Electrical System.

PVG. Control Valves - Electrical Connections from the Main Control Box.

4–Bank PVG Control Valves (From Tractor).



1. Push Bar.

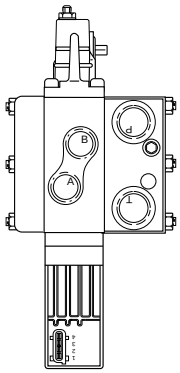
2. Pallet ‘Drop’

3. Pallet ‘Rotate’

4. Pallet ‘Lift”

1. 2. 3. 4.

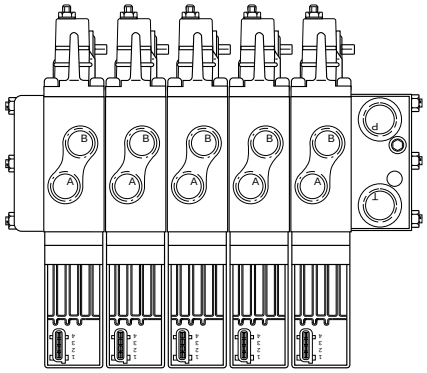
1–Bank PVG Control Valves (From Tractor).



1. Cutter Motor

1.

5–Bank PVG Control Valves. (From Aux’ Pump).



1. Index Conveyor.

2. Eject.

3. Gate.

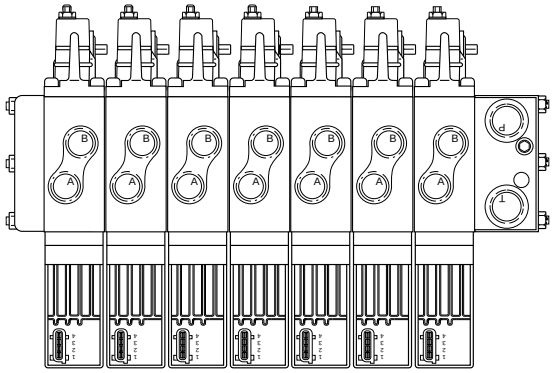
4. Cut-Off.

5. Conveyor.

1. 2. 3. 4. 5.

---

7 – Bank PVG Control Valves. (From Main Pump).



1. Arm Rotate.

2. Arm Lift.

3. Arm Reach.

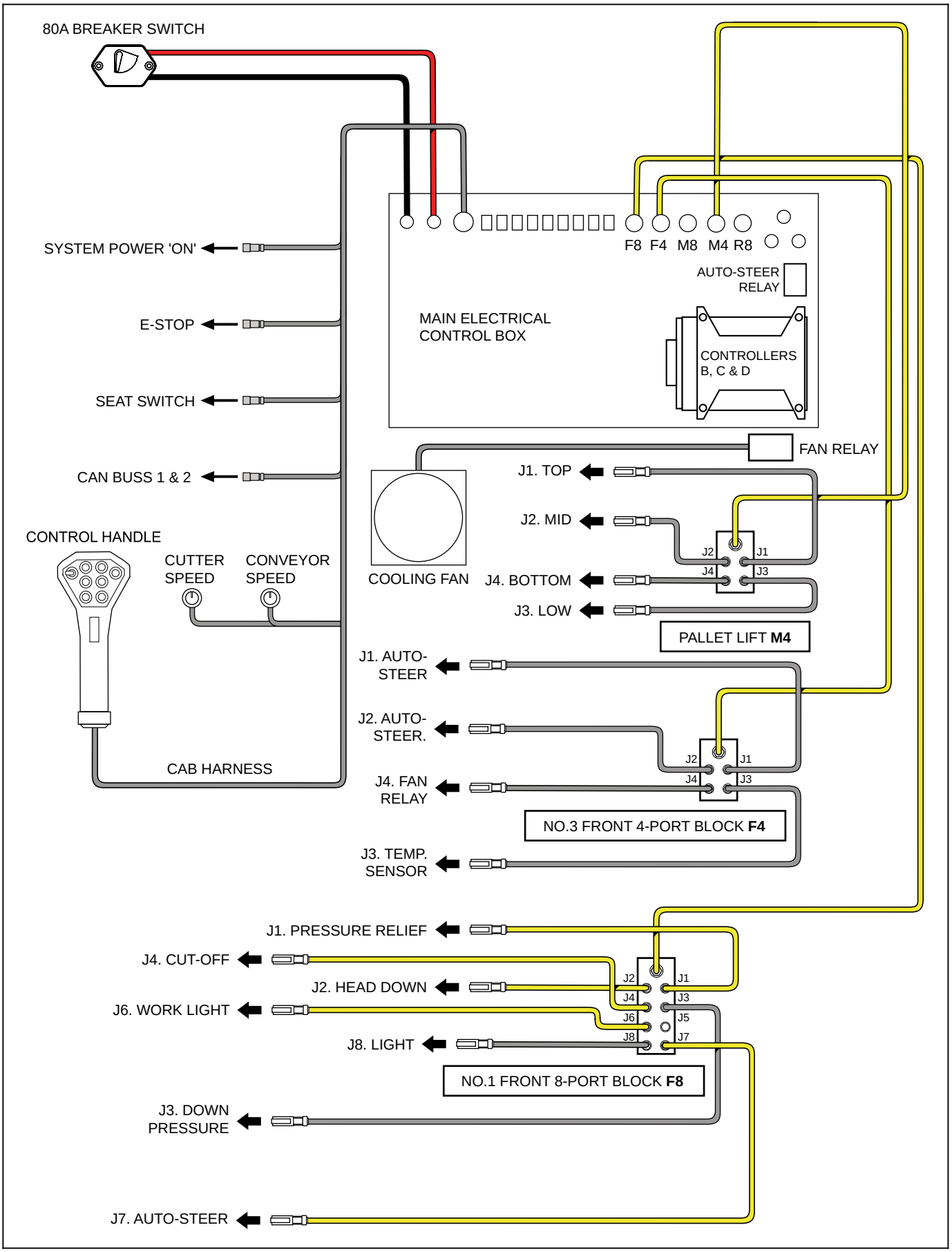
4. Gripper Head – Rotate.

5. Multi Grip.

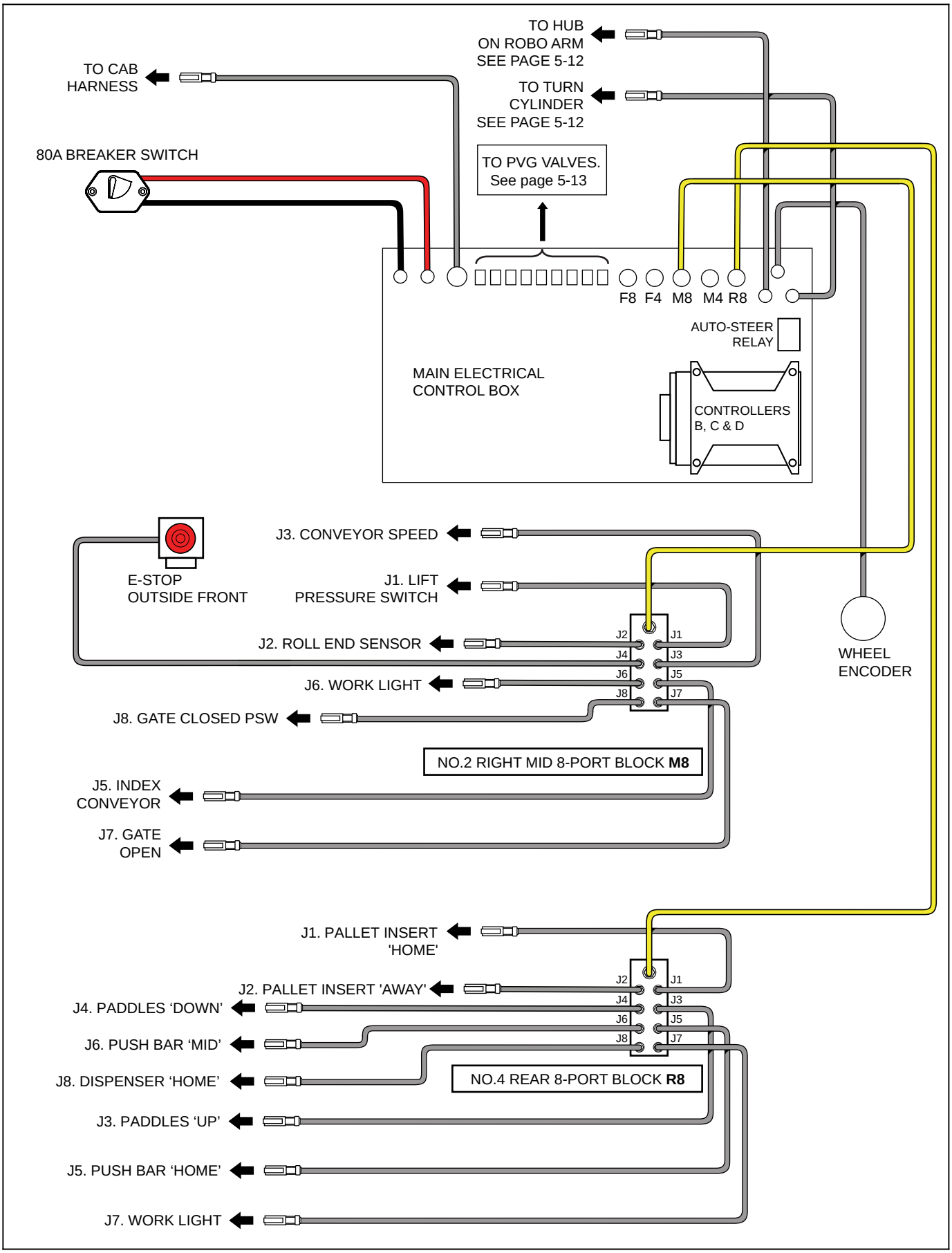
6. Single Grip.

7. Squeeze.

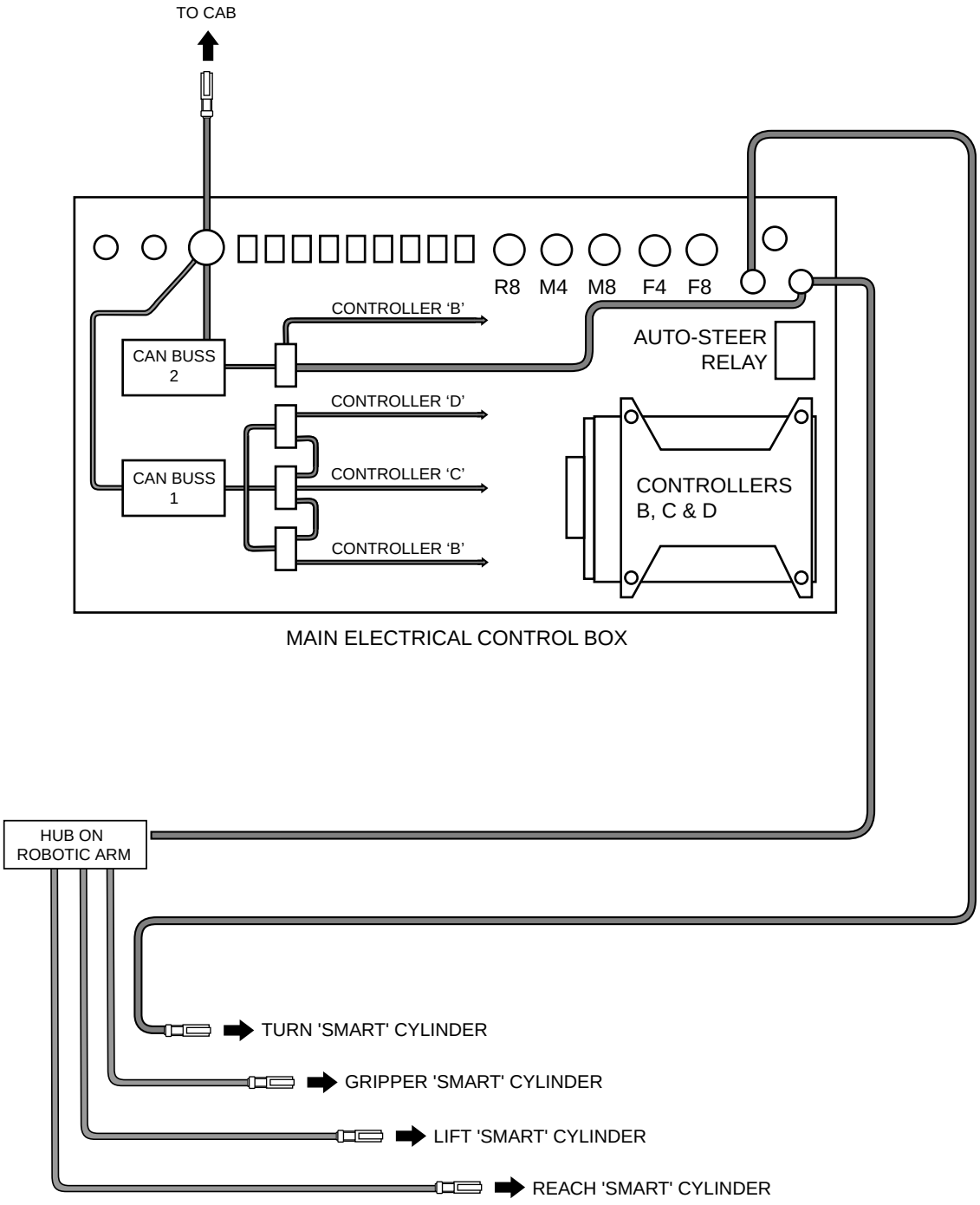
1. 2. 3. 4. 5. 6. 7.



ELECTRICAL SYSTEM DIAGRAM. Sheet 1
OPTIONAL PALLET INJECTION

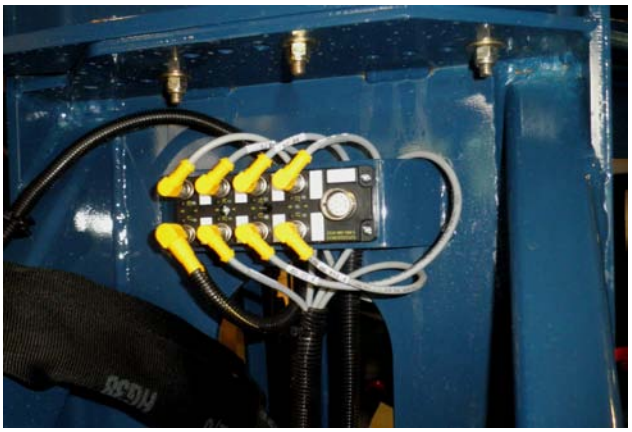


ELECTRICAL SYSTEM DIAGRAM. Sheet 2
OPTIONAL PALLET INJECTION

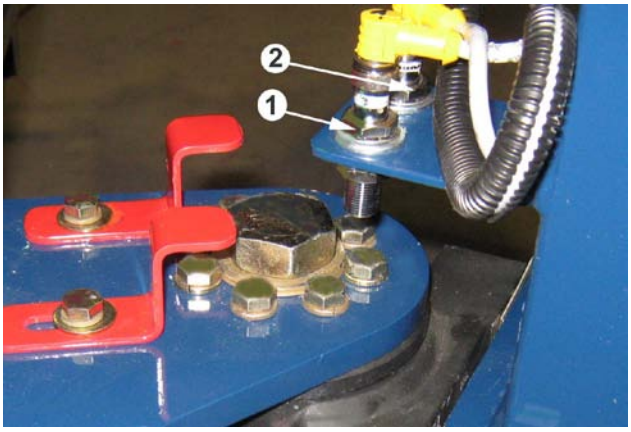


ELECTRICAL SYSTEM DIAGRAM. Sheet 3
OPTIONAL PALLET INJECTION

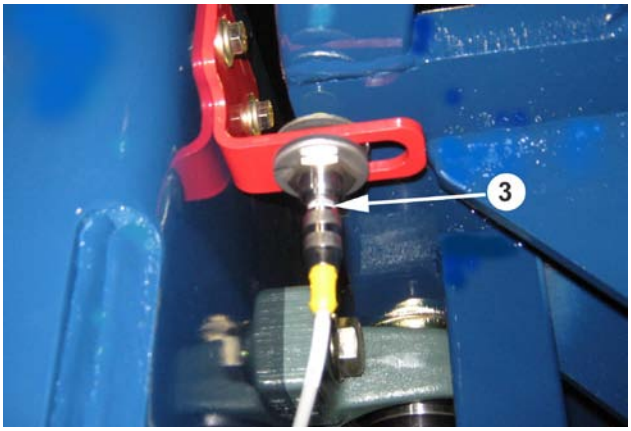
Rear 8-Port Block (R8), and PROX Sensors.



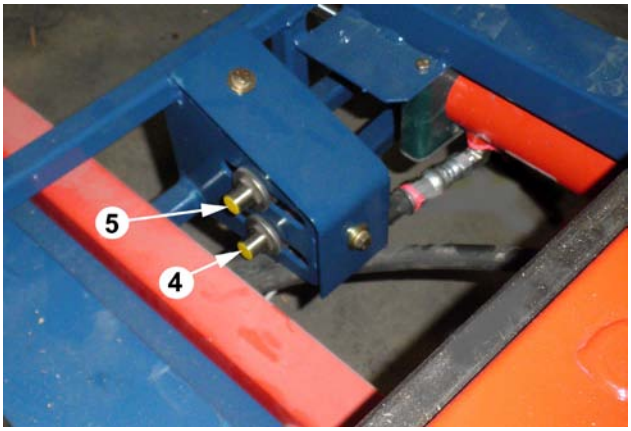
Rear 8-Port Block – R8.



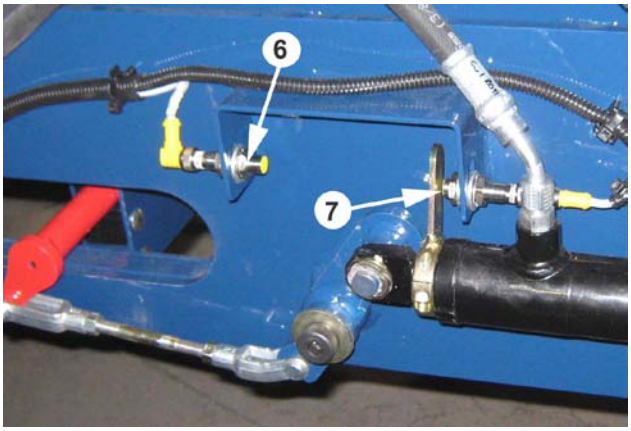
1. Pallet Insert 'HOME'. **2.** Pallet Insert 'AWAY



3. Dispenser 'HOME'.



4. Push Bar 'HOME'. **5.** Push Bar 'AWAY'.

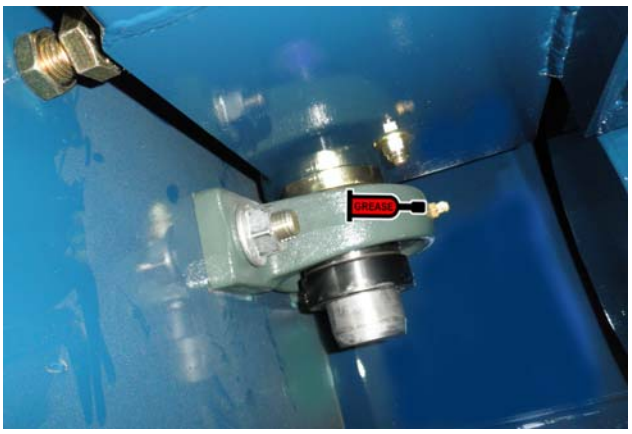


6. Paddles 'UP' **7**. Paddles 'DOWN'.

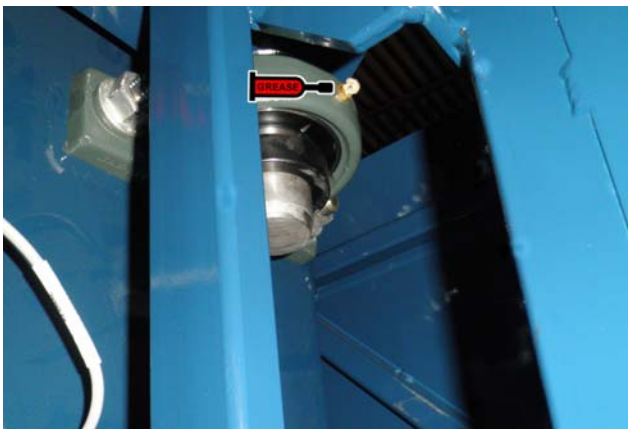
IMPORTANT

Check regularly the Sensors cable connections for tightness.
Clean dirt and debris from face of sensors.
Check the 'Gap' to the target component, not to exceed ¼ inch. (6.35mm).

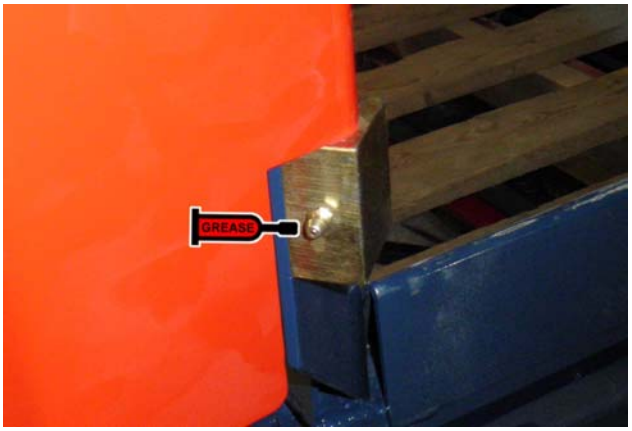
Pallet Injector Pivot Bearings – Lubrication.



Lower Pivot Bearing.



Top Pivot Bearing.



Pallet Retainer Flap. (Two Places. Bottom shown).

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